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FLOOD CONTROL WILD RICE RIVER - SOUTH BRANCH AND FELTON DITCH, --ETC(U)
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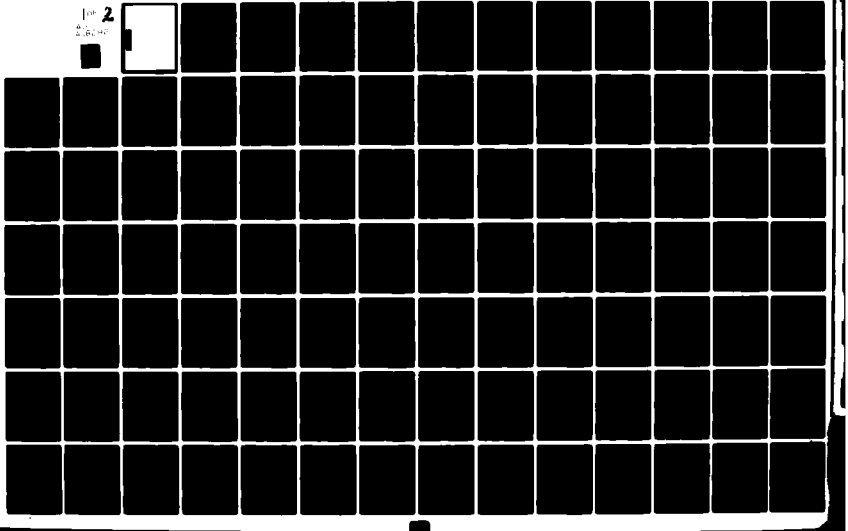

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The proposed project includes channel modification, levee construction, side ditch inlet modifications, lateral ditch inlet modifications and implementation of a wildlife corridor plan for certain reaches of the South Branch Wild Rice River and Felton Ditch, Minnesota.

Environmental impacts include reduction of annual flood damages by 75% on 96,500 acres of agricultural land. Partial or complete elimination of terrestrial vegetation would be necessary along various reaches of both

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waterways. Stream modification would result in a loss of some natural stream bottoms and distruption of the previously altered area. Constuction of a wildlife corridor along the modified reaches of the South Branch and Felton Ditch would increase the quality of terrestrial wildlife habitat immediately adjacent to the project.

The loss of 6.6 miles of natural stream in an area where few such streams exist must be considered an adverse impact. This loss would result in the disruption of a natural aquatic ecosystem.

F I N A L

ENVIRONMENTAL IMPACT STATEMENT

FLOOD CONTROL

WILD RICE RIVER - SOUTH BRANCH

AND FELTON DITCH, MINNESOTA

DEPARTMENT OF THE ARMY
St. Paul District, Corps of Engineers
St. Paul, Minnesota 55101
September 1974

SUMMARY

FLOOD CONTROL

WILD RICE RIVER - SOUTH BRANCH

AND FELTON DITCH, MINNESOTA

( ) Draft (X) Final Environmental Impact Statement

Responsible Office: U.S. Army Engineer District, St. Paul, Minnesota

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The proposed project includes channel modification, levee construction, side ditch inlet modifications, lateral ditch inlet modifications, and implementation of a wildlife corridor plan for certain reaches of the South Branch Wild Rice River and Felton Ditch, Norman and Clay Counties, Minnesota.

3. a. *Environmental Impacts:* The proposed project would reduce the average annual flood damages by 75 percent on 96,500 acres of agricultural land. The remaining flood damages would be approximately $183,000 annually based on 1973 price levels. Protection from the 6-percent frequency flood would relieve some of the anxiety associated with periodical flooding, as well as some of the financial impact. A total of 314 acres of land would be required, in addition to the existing channels, for project implementation. Of this total, 263 acres would be cropland, 25 acres pasture and hay, 24 acres natural habitat, and 2 acres farm windbreak. Channel modification would result in the loss of wildlife habitat along the South Branch and Felton Ditch. Partial or complete elimination of terrestrial vegetation would be necessary along various reaches of both waterways. Stream modification would result in a loss of some natural stream bottoms and disruption of the previously altered area. Such alteration would be disruptive to the naturally existing biotic communities. Construction of a wildlife corridor along the modified reaches of the South Branch and Felton Ditch would increase the quality of terrestrial wildlife habitat immediately adjacent to the project.

b. Adverse Environmental Effects: The loss of 6.6 miles of natural stream in an area where few such streams exist must be considered an adverse impact. This loss would result in the disruption of a natural aquatic ecosystem. Wildlife habitat and terrestrial ecosystems would be adversely affected by the removal of the existing vegetation along the South Branch Wild Rice River and Felton Ditch, thus disrupting various wildlife communities. Stream widening and the removal of streambank vegetation would raise water temperatures, and construction activities would have at least a temporary

adverse effect on aquatic communities.

4. Alternatives to the Proposed Project;

   a. No action.

   b. Flood warning.

   c. Floodplain evacuation.

   d. Flood proofing.

   e. Flood insurance.

   f. Floodplain regulation.

   g. Levee and floodway system.

   h. 9-mile-long, low-earth dam.

   i. Three upstream reservoirs.

   j. Channel modification.

   k. Channel modification plus diversion of Felton Ditch.

   l. Channel modification plus diversion of South Branch Wild Rice River.

   m. Channel modification and three upstream reservoirs.

5. Coordination: Comments on the draft statement were received from the following:

   Environmental Protection Agency
   Advisory Council on Historic Preservation
   U.S. Department of Interior
   U.S. Department of Agriculture, Forest Service
   U.S. Department of Transportation, Coast Guard
   Federal Power Commission
   Minnesota Department of Natural Resources
   Minnesota Department of Highways
   Minnesota Pollution Control Agency
   Minnesota Historical Society
   Wild Rice Watershed District
   Metropolitan Council, St. Paul, Minnesota
   Center for Environmental Studies, Bemidji State College

6. Draft statement noted in Federal Register 8 April 1974.

   Final statement to CEQ _____.

FINAL

ENVIRONMENTAL IMPACT STATEMENT

FLOOD CONTROL

WILD RICE RIVER - SOUTH BRANCH

AND FELTON DITCH, MINNESOTA

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT)

TABLE OF CONTENTS (CONT)

TABLES

FIGURE

REFERENCES

TABLE OF CONTENTS (CONT)

APPENDIXES

PLATES

FINAL

ENVIRONMENTAL IMPACT STATEMENT

FLOOD CONTROL

WILD RICE RIVER - SOUTH BRANCH

AND FELTON DITCH, MINNESOTA

1. PROJECT DESCRIPTION

INTRODUCTION

1.01 The proposed project is a single-purpose flood damage reduction plan for the South Branch Wild Rice River and Felton Ditch watersheds, Clay and Norman Counties, Minnesota. Salient features of the project include channel enlargements of both streams to contain 6-percent frequency floods and dikes which are proposed for the upstream limits of Felton Ditch (Plate 1).

1.02 The project was recommended by the Chief of Engineers in House Document No. 98, 90th Congress, 1st session, and was authorized by the Flood Control Act approved 13 August 1968 (Public Law 90-483). The first contracts for construction, based on the present schedule, could be let in March of 1976. Current economic projections assume the project to be in operation in 1978.

CHANNELS

1.03 The South Branch of the Wild Rice River would be subject to debris removal from its mouth to mile 1.4. From mile 1.4 to 8.1 and 14.2 to 16.0 the channel would be enlarged by the excavation of only one bank where possible. The remainder of the stream between mile 8.1 and 14.2 would require excavation of both banks as now conceived.

1.04 The Felton Ditch channel would be subject to debris removal from mile 0 to mile 1.6 while channel enlargements would be necessary between mile 1.6 and mile 17.1. One bank only would be excavated wherever possible from mile 4.8 to mile 6.0 and mile 8.1 to 8.4. The excavation of both banks would be necessary from mile 1.6 to mile 4.8, mile 6.0 to 8.1, and mile 8.4 to mile 17.1 as now conceived.

1.05 The slopes of the spoil banks would be 1 on 3 and 1 on 4 on the riverward and landward sides, respectively. Height of spoil banks would be limited to 8 feet on the normal leeward side and 4 feet on the normal windward side of the channel. The spoil banks would be discontinuous at all side ditches or natural drains to provide outlets into the channel.

DIKES

1.06 The upper limit of the project on Felton Ditch, between miles 17.1 to 19.9 would not be excavated. Along this reach, the natural channel would be inclosed with flanking dikes in order to confine design flows, thereby preventing overbank flow from moving cross country and flooding lower basin areas landward of the hydraulically improved downstream channel. Flanking dikes were used in lieu of channel work in order to avoid damage to a put and take trout fishery.

BRIDGE WORK

1.07 The proposed project would require the removal and replacement of one bridge with a larger structure, removal and replacement of three bridges with either multiplate or reinforced concrete pipe arches, and channel bank protection at three bridges. All costs associated with new construction, alteration, modification, or reconstruction of highway and farm access bridges would be allocated to non-Federal interests. The costs for channel bank protection at three bridges would be borne by the Federal government.

SIDE-DITCH INLET MODIFICATIONS

1.08 The proposed channel modifications would necessitate the alteration or construction of approximately 108 side-ditch inlets. Structural changes to inlets would be necessary at all locations where legal ditches, road ditches, private ditches, and natural drains would outlet into the modified channel.

LATERAL DITCH ENTRY MODIFICATIONS

1.09 Lateral ditches located at river miles 15.5 and 13.1 on the South Branch would be plugged and replaced with 36-inch culverts, flap gates, and headwall outfalls. At present, flooding of adjacent farm land occurs when the lateral ditches become overloaded.

DROP INLET STRUCTURE

1.10 A drop inlet structure is proposed at mile 17.1 on Felton Ditch. This structure would be required to prevent scouring and erosion which could occur in the transition from existing natural channel to the modified sections.

WILDLIFE CORRIDOR

1.11 The proposed project would include a wildlife corridor along the channels

of the South Branch and Felton Ditch. The corridor would increase the quality of terrestrial wildlife habitat immediately adjacent to the project. The construction area would be planted to a mixture of native short grass species, the exact composition to be decided on in cooperation with the Fish and Wildlife Service and the Minnesota Department of Natural Resources. The advisability of low-growing shrubs and trees along the channel would also be considered. Plate 2 illustrates several possible alternatives in the wildlife corridor concept.

OPERATION AND MAINTENANCE

1.12 Project maintenance would be the responsibility of local interests.

APPORTIONMENT OF COSTS

1.13 Total first costs for the proposed project are estimated at $2.6 million being the Federal first cost and $0.3 million the non-Federal first cost. Total annual costs for the project would be $123,000 while the benefits would be $543,000 annually. This results in a benefit-cost ratio of 4.4 to 1. The economic analysis is based on a 50-year economic life and a 3 1/4 percent interest rate. The project would prevent 74.8 percent of the flood damages on 96,500 acres of agricultural land. The remaining average annual flood damages would be approximately $183,000.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

INTRODUCTION

2.01 The Wild Rice River basin, which includes the project area, is comprised of the majority of Norman County, and portions of Clay, Mahnomen, Clearwater, and Becker Counties. This area has been noted for wide-spread and damaging floods which have been recorded since 1882. Very damaging floods have taken place in April and May of 1950, in 1965, and 1969.

2.02 Major flooding of extensive agricultural areas is the most serious water resource problem in the South Branch Wild Rice River and Felton Ditch watersheds. As these streams emerge from the escarpment area of the watershed, stream slopes become more mild and channel capacities decrease, causing floodwaters to escape the channel and move overland, inundating thousands of acres of highly productive cropland. This flood-prone area is located along the South Branch from the mouth upstream to about mile 16 and along Felton Ditch between the mouth and mile 20. The maximum area subject to flooding is about 121,000 acres, of which about 95 percent is under cultivation.

2.03 Destruction of crops and related agricultural losses constitute the principal damages from flooding. The extent of losses resulting from a particular flood is dependent upon the season of its occurrence and on the amount and timing of precipitation following the flood. A spring flood immediately preceding or occurring during the soil preparation and planting period could result in reduced yields and poor crop quality on acreages which could still be planted following subsidence of the flood. A summer flood could completely destroy a large percentage of the growing crop, and a flood occurring during harvest season could destroy the unharvested portion of the crop. Other agricultural damages include damages to farmsteads, barns, stored crops, machinery, and fences and to lands through soil erosion and spreading of noxious weed seeds. Highway and bridge damages in the area are relatively small due to the flat gradient of the channels and the low stream velocities.

2.04 Average flood damages sustained annually in the South Branch and Felton Ditch area are estimated at $726,000.

GEOLOGY

2.05 The geology influencing the environment of the South Branch Wild Rice River and Felton Ditch watersheds is a legacy of massive glaciers that covered the area during the Pleistocene Epoch. Allison(1932) discusses the geology of northwest Minnesota in detail. He states that prior to the invasion of the glaciers, the land consisted of a Precambrian crystalline rock surface mantled by a thick residue of weathered rock and scattered remnants of Cretaceous shales and sandstones. On this surface, the glaciers deposited 200 to 500 feet of glacial drift consisting of tills, outwash sands and gravels, lake clays and sandy shoreline deposits. The western or Red River Lowland section of the watersheds lies within the basin of glacial Lake Agassiz. This lake was formed by the damming with glacial ice of the natural northerly drainage of the area. The lake at one time covered approximately 110,000 square miles and was a reservoir in which thick deposits of clay and silt were laid down. As the ice dam melted away and the lake water receded, sandy shorelines were established at various levels around the lake. The shorelines are evident today as low, sandy ridges. The sequence of materials under the lake bed of the extreme western portion of the area is approximately 80 feet of lacustrine silt and clay underlain by 200 to 250 feet of glacial till. These materials rest on a nearly continuous bed of Cretaceous sediments approximately 50 feet thick which is underlain by Precambrian crystalline rocks. The lacustrine silts and clays thin eastward and end in the shoreline deposits which form a band 3 to 8 miles wide, 20 to 30 miles east of the Red River of the North. Throughout the rest of the area, glacial deposits consisting primarily of till, 250 to 500 feet thick, underlain by Precambrian crystalline rock comprise the geologic column. The till is an unsorted mixture of silt and clay with lesser amounts of sand, gravel and boulders. Lenses and beds of sand and gravel ranging from a few inches to several feet in thickness occur in many places throughout the till.

2.06 The glacial deposits have been essentially unaltered by erosion since their recent deposition. The various types of deposits are, therefore, apparent and account for the topographic variations which can be placed in three general categories:

the Lake Agassiz plain, the shoreline area of the western part of the watersheds, and the gently rolling and poorly drained ground moraine to the east.

2.07 The area is structurally stable and without tectonic disturbances of regional or local magnitude. The Seismic Risk Map developed by St. Algermissen (U.S. Coast and Geodetic Survey, 1969) shows the area to lie in zone 1 or a noncritical area that could expect only minor damage from any probable earthquake. Local sloughing of the banks along the larger rivers in the Red River Lowland is common, but mass movement is not a prominent feature east of the Lake Agassiz basin.

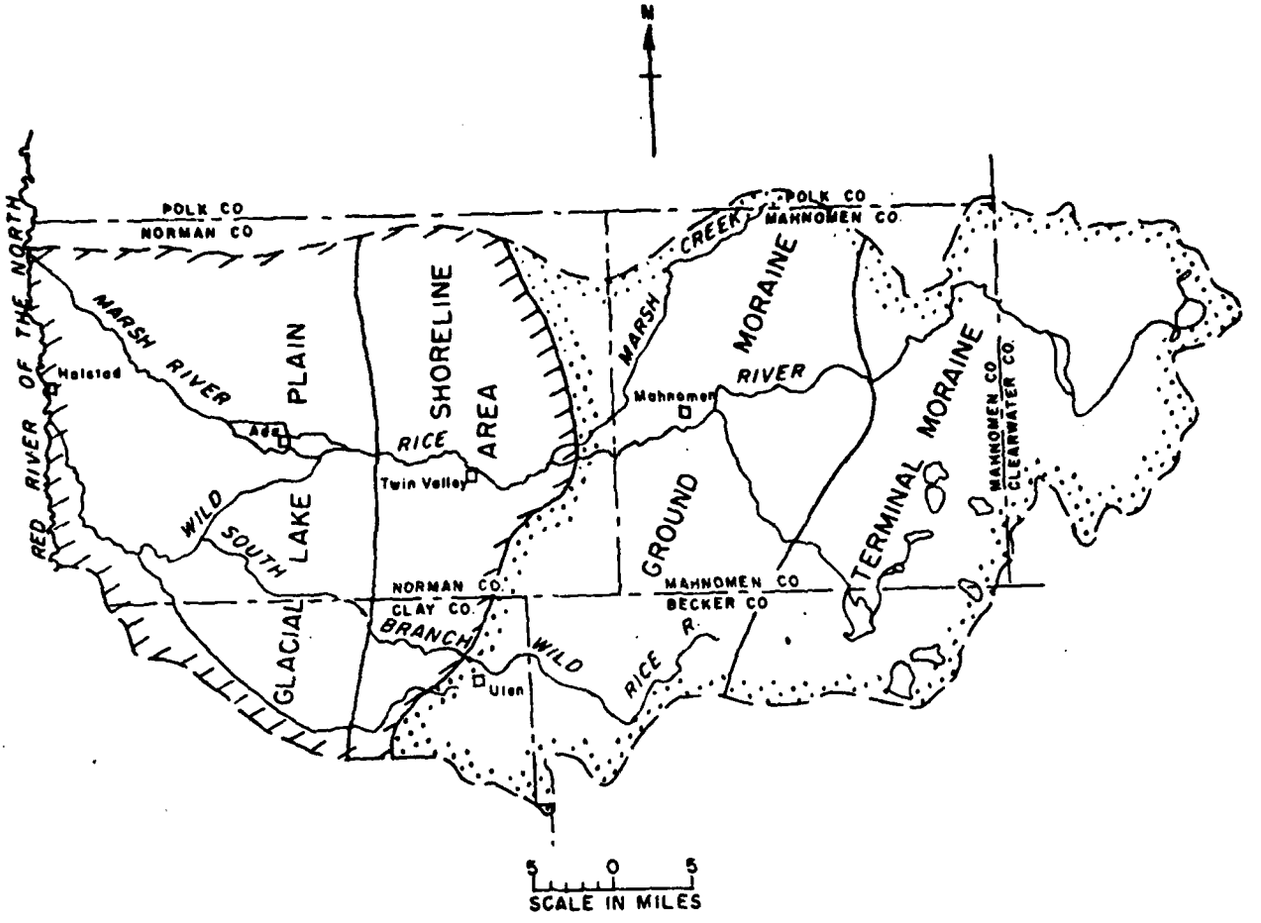
2.08 Economic mineral deposits in the South Branch Wild Rice River and Felton Ditch watersheds are restricted to deposits of sand and gravel located in the shoreline area of the Red River Lowland and in the glacial moraine area. These deposits are most abundant in the shoreline area where they occur between elevations 975 to 1050 feet above mean sea level (MSL). The U.S. Geological Survey 7 1/2 minute topographic maps dated 1965 and 1966 show 35 gravel pits between these elevations in the vicinity of the two drainages.

2.09 Natural problems relating to the geology of the watersheds are nonexistent. The potential for geologic related problems caused by the works of man does, however, exist. The thick deposits of silts and soft clays present throughout the Red River Lowland are notoriously unstable in excavations or as foundations for earth fills, bridges or large structures. The possibility of contaminating surface water or groundwater should always be considered in the locating of disposal sites for liquid or solid wastes.

2.10 The entire watershed area is composed of geologic features that could be considered unique on a continental scale. On the basin scale, however, there are major land forms for which the term geologic feature is misleading. Although it is possible that some persons or groups may consider a particular exposure or glacial deposit unusual or rare, no feature in the basin is known to be generally accepted as unique.

TOPOGRAPHY

2.11 The South Branch Wild Rice River and Felton Ditch drain areas of approximately 253 and 142 square miles, respectively. The two watersheds occupy the southwestern portion of the Wild Rice River basin which is part of the greater basin of the Red River of the North. Three distinct regional landforms characterize the two watershed areas (figure 1). These features were formed during the Pleistocene Epoch and have remained essentially unaltered by erosion since the glaciers retreated from the area. The western one-half of the area lies in the Red River Lowland which was the basin of glacial Lake Agassiz, a large lake that covered much of eastern North Dakota, western Minnesota and central Canada during the waning stages of the glacial epoch. The lake basin is represented in the watersheds by a broad featureless plain to the west bordered on the east by a sloping shoreline area marked by abandoned beach ridges.



LEGEND

RED RIVER LOWLAND

GLACIAL MORAINIC AREA

FIGURE 1
MAJOR PHYSIOGRAPHIC AREAS
IN THE MARSH RIVER AND
WILD RICE RIVER BASINS

A glacial moraine area borders the Red River Lowland on the east. The moraine area has a nearly level to hummocky, poorly drained surface at an average elevation of 1,200 feet above msl. Local relief in the area averages less than 20 feet although the river is incised 30 to 40 feet below the till plain surface.

2.12 The South Branch Wild Rice River originates in the moraine area where it has formed a narrow channel in a marshy flowage. The river forms a prominent feature in the shoreline area and has eroded a narrow valley and floodplain. The natural stream terminates, however, where the shoreline area joins the broad lake plain and has been extended by a ditch for about 5 miles to join a shallow, meandering improved channel that continues westward to the Wild Rice River.

2.12 Felton Ditch is a shallow, narrow excavation 12 miles in length that extends a short reach of natural drainage across the flat lake plain to a short meandering improved channel that flows northwesterely to the Wild Rice River. The natural drainage, Felton Creek, is a narrow channel that originates in the moraine area near its western border, crosses the shoreline area and ends at the lake plain.

SOILS

2.14 Some of the more common basin area soil groups include members of the Fargo, Bearden, Ulen, and Barnes soil groups. These are the soil divisions which are of prime importance to the agriculturally oriented Wild Rice River basin including the project site (Soil Survey, 1939).

2.15 The Fargo group is composed of soils of a clay nature. Fargo clay and Fargo silty clay loam are two of the most extensive soils of the basin. Both soils are dark gray to black and occupy great expanses of land that were originally prairie. Texture of both types is such that moisture is retained, resulting in a sticky, slow drying soil. An increased number of legal drains has resulted in a more efficiently drained landscape, thus directly benefiting these soil types.

2.16 The members of the Fargo soil group are intensively cultivated in the Wild Rice River basin and are generally very productive.

2.17 Members of the Bearden soil group are generally dark gray to black and range from 8 inches to 2 feet in thickness. Bearden loam and silt loam are easily tillable under a wide range of conditions and are usually adequately drained. The ditching, which is common throughout the Agassiz Lake bed region, has impaired drainage for this soil type in marginal regions. Members of the Bearden group are generally silt loam, rich in lime, provide a good seed bed, and do not clod. As is the case with the Fargo soils, the Bearden members are intensively cultivated.

2.18 Ulen loamy sand is a drak gray to black soil with a consistency which grades into a light brown or yellowish brown sand.

Sandy loam is generally very dark gray and ranges from loamy sand to silt loam. These two soils comprise the less common Ulen group. Both soil types have a low moisture holding capacity and dry rapidly. Wind erosion, where these soils are cultivated, can be of considerable concern after fall plowing.

2.19 The final major soil group in this area is the Barnes group. Barnes loam and Barnes silt loam are not extremely common in the area. Both soils are very dark grayish brown to black. The loam fraction of this division is more common than the silt loam and tends to compact in the virgin condition. Characteristics common to the members of this division include a high lime content, rapid drying, and adequate surface drainage. Cultivation of both soil types is intensive.

CLIMATE

2.20 The climate of the region combines typical features of the continental climate of the central United States. It is characterized by long winters and relatively hot summers. About 78 percent of the annual precipitation occurs during the growing season from April though September.

2.21 Temperature extremes in Norman County range from a low of -53° F. at Ada on 15 February 1936 to 111° F at Ada on 6 July 1936 resulting in a temperature range of 164° F. January is normally the coldest month with an average temperature of 7° F., while July is normally the warmest month recording an average temperature of 71° F. The average annual temperature for the basin is about 41° F.

2.22 Changes from one season to another are generally rather sudden. The change from fall to winter commonly occurs at the end of October or during the first half of November when a sudden cold wave develops which freezes the ground, stopping all field work.

2.23 The snowfall during the winter totals about 31 inches on the average. Much of the snow blows around due to the exposure of the flat and open country to the winds and some of it settles in ditches, low places or wooded areas. Consequently, the ground in some places freezes to a considerable depth. Nearly every winter has one to four severe blizzards, in which the snowfall is accompanied by strong winds and often by very low temperatures. The spring break of the cold period commonly occurs during the latter half of March or the beginning of April. The snow cover melts rapidly, and the land thaws and dries sufficiently to allow the beginning of agricultural operations as early as the middle or the latter part of April. However, ground frost may be encountered at considerable depth in some places as late as the end of May.

2.24 Because of their undulating or rolling relief, which provides for runoff of the spring rains, the fields in the open part of the upland section dry considerably faster than those in the lake bottom plain. Generally, the soils of this section are ready for spring field work and

are sufficiently warmed for germination of seed earlier than the soils of the plain. The spring runoff from the flats in the lake bottom section is slow. The deep drainage ditches are often filled with ice and snow which does not thaw in time to render the ditches most serviceable. This results in a slow opening of the ditches which delays the runoff and causes the submergence of large areas of land, sometimes for several weeks.

2.25 The last killing frost generally occurs during the latter part of May throughout most of the area. However, the last frost may occur during the early part of June. The earliest frost generally comes in the latter part of September. The length of the frost-free season in the basin is usually between 110 and 143 days.

2.26 The average annual number of sunny days is about 90. Approximately 110 days are recorded as partly cloudy and about 165 days are usually cloudy every year. The number of days with measurable precipitation is approximately 100 during a year.

2.27 The mean annual rainfall is about 20 inches for the entire area. About 16 inches of rain fall during the months from April to September. More than 9 inches of rain occurs from May to July, while the winter months, December, January, and February, total less than 2 inches of precipitation.

2.28 The data for the driest and the wettest years show great variations although the deviation from the normal rainfall is not so extreme as to be completely unfavorable for agriculture. The recorded maximum precipitation of 33.39 inches occurred in 1941, and the recorded minimum precipitation of 10.07 inches occurred in 1910 at Ada.

2.29 Crop injury from excess moisture is more common in the western part of the area adjoining the Red River. This can be attributed to the heavy texture of the surface and subsurface soils as well as the flat relief of the country. This results in reduced drainage activity both on the surface and through the soil. Crop injury by drought more frequently occurs on the sandy soils which occupy the central and eastern parts of the lake bottom plain.

2.30 Both the lake bottom and the upland sections have practically the same amount of precipitation per unit of surface. However, due to the difference in relief, the soils of the lake bottom section are able to retain a far greater proportion of the rain water than are the soils of the upland region. Thus, during dry summer years, the soils of the plain more greatly benefit from the precipitation. These soils are not as susceptible to erosion when compared to the slopes of the rolling country. These slopes are marked by many "baldpates" resulting from the wasting away of the dark colored surface soils and the exposure of the light colored subsoils.

2.31 The flat prairie land of the Red River Valley is fully exposed to all wind movements, and, although the wind velocity usually is not very high, strong winds may occur in all seasons. Two especially windy periods usually occur during the year, each of about 1 or 2 weeks duration, one in late spring, usually in the second half of May, and the other in the fall, usually in October.

Both occur at the time when at least a part of the cultivated land is unprotected by crops. Drifting soil during these periods often causes damage to growing crops and fills in drainage ditches.

GROUNDWATER

2.32 A summary of the groundwater conditions in the Wild Rice River basin which includes the subject areas, is presented in the following paragraphs (U.S. Geological Survey, 1970).

2.33 The primary source of groundwater in the Wild Rice River basin is the glacial drift. Except in the extreme western part of the basin, water for domestic and farm supplies can usually be obtained from wells less than 150 feet deep. Most wells are developed in sandy or gravelly phases in the glacial drift. Therefore, if municipal or industrial supplies are required, test drilling is usually necessary to locate a reliable source.

2.34 The basin may be separated into two general areas with respect to groundwater movement. The eastern half of the basin is a groundwater recharge area. Due to the poor drainage of this area, precipitation collects in low areas where some of it seeps to the subsurface. Groundwater movement is generally down and westward. The western half of the basin is a groundwater discharge area. Groundwater movement in this area is upward. This phenomenon accounts for a zone trending northward through the western area in which flowing wells may be developed.

2.35 The groundwater may be classified by quality into four major groups: calcium magnesium bicarbonate, calcium magnesium sulfate, sodium bicarbonate, and sodium chloride. The calcium magnesium bicarbonate and calcium magnesium sulfate waters occur in the eastern, or recharge, area and at shallow depths in the western area. The sodium bicarbonate water occurs in the western, or discharge area. The sodium chloride water is found in the extreme western edge of the basin where it occurs in the Cretaceous sediments and adjacent glacial drift. Water in the recharge area contains 300 to 500 milligrams per liter (mg/l) dissolved solids. The dissolved solids in the discharge area range from 500 to 1200 mg/l. The applicable water quality standards, the 1962 U.S. Public Health Service standards for groundwater to be used for domestic consumption, allow no more than 500 mg/l total dissolved solids.

2.36 Groundwater contribution to streamflow is most significant from the outwash sand and gravel of the moraine area and the beach ridges and sand hills in the shoreline area of the Red River Lowland. Little or no contribution to streamflow is made in the glacial lake plain.

VEGETATION

2.37 An environmental survey was conducted by Hibbard (1973), and many

of his comments and conclusions have been incorporated into the biological sections of this report. In general, the natural vegetation of the Wild Rice River basin is composed of a mixed grass prairie, oak-savanna, deciduous forest and coniferous forest on a gradient from west to east.

2.38 The natural vegetation of the Agassiz Lake plain within which the recommended project is located was bluestem prairie dominated by big bluestem, little bluestem, switchgrass, and Indian grass. The prairie vegetation now exists only in small scattered patches because most areas have been converted to agricultural uses. Within the prairie, other vegetational systems occurred as a result of watercourses and topographic features. Thus natural forest vegetation extended into the prairie along streams such as the South Branch Wild Rice and was dominated by cottonwood, American elm, willow, box elder, basswood, and green ash. Marshes were interspersed in the prairie in potholes and sloughs. These systems were dominated by cattails and bulrush and were fringed by wet prairie species such as reed-canary grass, phragmites and sloughgrass. A portion of the Felton Ditch area was a large marsh and wet prairie area until drainage ditches effectively drained the area in the 1900-1910 era. A similar situation existed where the South Branch Wild Rice River flowed onto the flat Lake Agassiz plain. There are still many wetlands in the upland areas of the basin, but their number and areal extent are much reduced.

2.39 The oak-savanna region extends from the beach ridges of ancient Lake Agassiz a few miles eastward of the project area to give way rather abruptly to the maple-basswood deciduous forest region. The oak-savanna is dominated by bur oak as the overstory along with a mixture of grasses and forbs as the understory. Well-drained, sandy soils are characteristic of the oak-savanna type. Interspersed in the oak-savanna region are marshes and wet prairies which occur in the potholes and wetlands. Natural forest types occur along the streams and in the valleys that are carved by stream flow through the beach ridges. Fire was necessary to maintain the prairie and oak-savanna types. Bur oak, because of its thick bark, was able to withstand the prairie fires and in part serves as a fire break between the prairie to the west and deciduous forest to the east. Other factors such as drainage, soil type, and precipitation serve to create the impressive diversity of ecosystems present in this basin. This area is ecologically unique in that a person can pass through tall grass prairie, oak-savanna, maple-basswood forest, and coniferous forest (balsam fir, spruce and tamarack) in less than an hour's drive.

2.40 The present vegetation of the project area is vastly different when compared to the potential climax communities. Most of the original prairie has been converted to agricultural uses. Thus for the Red River Valley portion of the South Branch Wild Rice and Felton Ditch, the vegetation is primarily cultivated small grain crops. Along the natural streams, a narrow fringe of riparian vegetation occurs, composed of American elm, basswood, cottonwood, box elder, willow and green ash as the overstory. Shrubs such as dogwood, buckbrush, currant, rose, juneberry and plum occur along this thin riparian fringe in varying densities, usually as the influences of man dictate. Herbaceous cover along the streams in this area displays a considerable amount of variation due to factors such as presence or absence of overstory vegetation

and disturbance factors such as bank slumping or channel clearing. Most of Felton Creek exists or is known as Felton Ditch (mile 1 to 20), Judicial Ditch No. 56 (Norman County) and County Ditch No. 45 (Clay County) in the Red River Valley. Upstream from approximately mile 20, Felton Creek has not been channelized. In the ditched area tree and shrub growth is sparse and in some reaches is absent. Herbaceous cover consisting of grasses and forbs exists as annuals in recently disturbed or colonized areas to mixtures of annuals and perennials in the somewhat less disturbed areas of the ditch. Cattail stands are frequent in the bottom of the ditch as are other hydrophytic plant species.

2.41 The lower reaches of Felton Ditch exist as a coulee-type natural drainage pattern. This is particularly pronounced from the confluence of the Felton drainage with the Wild Rice River upstream to about mile 2 of Felton Ditch. This reach has had little or no modification to the natural drainage pattern and consequently has well developed riparian vegetation systems. Above this point to about mile 6, woody vegetation has developed since the original ditch was installed in the 1900-1910 era. This vegatation exists as a continuous band of thin riparian gallery in some short reaches to scattered trees and shrubs in other reaches. Above mile 6 to the upstream end of Felton Ditch, scattered trees and shrubs can be found. The dominant vegetation is herbaceous.

2.42 Upstream from mile 20, Felton Creek meanders through the beach ridges of Lake Agassiz and gradually tapers into a grassed waterway in a grain field on the uplands in Clay County. Diversity and abundance of plant and animal species increase dramatically as one leaves the ditch and enters the creek. Felton Creek has riparian woody vegetation throughout most of its length and has a floodplain forest developed in the valley carved by the stream flowing through the Lake Agassiz beach ridges. Willow, box elder, basswood, American elm, and green ash are the dominant overstory types. Shrubs exist mainly as willows, dogwood, rose and buckbrush, although nearly all of the woody species listed in appendix A can be found in the drainage area. Relic stands of native prairie and excellent grazed prairie occur adjacent to the Felton Creek valley in the beach ridge area.

2.43 The South Branch Wild Rice River generally has the same, but usually more complex, vegetation types in comparison with Felton Ditch. A narrow riparian fringe of elm, basswood, green ash, box elder, cottonwood and willow occur along the natural stream in the Red River Valley portion of the basin. As the well-defined valley is encountered in the beach ridge area, the woody vegetation increases in diversity and abundance. Bottomland, slope and upland forest types occur in this area. Above the beach ridges or on the uplands, the river once again becomes fringed with a thin riparian edge similar in composition to those already described. Marsh and slough areas become frequent in the unditched portions of the dendritic tributary systems of the South Branch Wild Rice River.

2.44 The vegetation of the South Branch Wild Rice River watershed, in the vicinity of Ulen, Clay County, Minnesota, is perhaps worthy of a more detailed discussion.

In this general area, mile 16.7 to mile 23, stands of bottomland vegetation dominated by basswood, American elm, green ash and box elder occur in a relatively undisturbed condition. The uplands adjacent to the valley have stands of oak-savanna, dominated by bur oak as the overstory and an herbaceous layer of prairie dominated by little bluestem, side oats grama and blue grama depending upon the disturbance factor. Several small stands of unbroken prairie that have been grazed and appeared to be in good condition were noted on a field reconnaissance of the area. The slopes in this area generally have an intergration of the bottomland community types with the oak-savanna community. Superimposed on these three types are the plant species which have invaded the area since the cessation of prairie fires and the advent of man's activities and influences. Since this is a tension zone between the prairie and deciduous forest, it is not surprising that white birches for instance, are found in a specific location, surrounded by prairie. Appendix A contains a listing of the more common trees, shrubs and herbaceous vegetation found in the river basin.

2.45 Between mile 8.1 and 16.7, the South Branch exists as a ditch, and thus very limited woody vegetation is found in this reach. Herbaceous cover, composed of grasses and forbs containing mixtures of annuals and perennials, occur depending on disturbance factors for each particular site.

2.46 The reach extending from the confluence of the South Branch with the Wild Rice River upstream to mile 8.1 contains riparian vegetation in varying densities. This is almost exclusively natural coulee-type drainage. The South Branch Wild Rice River was connected directly to this drainage by State Ditch 10, apparently in the early 1900's. Formerly, the South Branch emptied into a marsh on the flat Lake Agassiz plain and this then trended toward the coulee type drainage area of the river. The lowermost reaches up to about mile 2 contain a narrow but well-developed riparian gallery of the species already described. Above mile 2 to mile 8.1, the riparian woody vegetation becomes thinner and scattered. There are a few areas in this reach near abandoned farmsteads where the flood-plain vegetation is well developed. The riparian vegetation is limited to scattered large trees in the areas used as pastureland.

2.47 The present vegetation of the watershed east of Ulen is primarily cultivated small grain crops and grazed prairie. Scattered aspen stands are found in this area as well as remnant stands of native prairie and oak savanna. The riparian vegetation is generally the same as that already described but exists as either a thin fringe or is absent except for herbaceous cover.

2.48 Much of the watercourse in the headwaters region is pasture, but a few areas of bush type prairie (wet prairie and shrub willow) and marsh areas exist today.

STREAM RESOURCES

2.49 The biological values associated with the South Branch Wild Rice River and Felton Ditch are quite variable.

Inasmuch as portions of each stream have previously been ditched, the biological diversity and present importance of the ditches have been drastically reduced. On the other hand, the unmodified portions of these same streams do have rather diverse biological systems and hence are biologically important.

2.50 As mentioned earlier, Felton Ditch was constructed near the turn of the century and has been maintained as a ditch to the present. Hence, approximately 20 miles of relatively unproductive watercourse exist because of the general absence of the habitat diversity needed to support a healthy stream ecosystem. The flora and fauna in the ditch is limited in comparison with that for diversified habitats. Some of the life forms found in the Wild Rice River are found in the ditch and might be locally abundant at times, for example, during spawning runs of suckers and northern pike.

2.51 Upstream from mile 18.7, Felton Ditch becomes Felton Creek and is accompanied by a dramatic increase in habitat diversity. Felton Creek includes pools, riffles, undercut or overhanging banks, overhanging woody riparian vegetation and a variety of bottom types containing rocks, boulders, sand, gravel silts, muds and organic debris such as leaves, limbs and larger parts of trees. This habitat diversity is in part largely responsible for the myriad of life forms which live in Felton Creek. Brook trout are stocked annually in the creek by the Minnesota Department of Natural Resources. This is unusual for a stream in the Red River Valley. Mayfly, midge, and caddisfly larvae are common benthic invertebrates in the creek. Appendix F contains a provisional listing and occurrence of the biota found in the Felton Ditch and the South Branch.

2.52 The South Branch Wild Rice River exists as a combination natural stream and ditch. The ditched portions are essentially the same biologically as those described for Felton Ditch. The first 8 miles of South Branch are essentially natural channel, while mile 8.1 to mile 16.7 is ditch. Above mile 16.7 natural channel exists, except in the headwaters region where drainage ditches are frequent on the tributary streams. Definite pool-riffle patterns exist in the natural stream and contain a varied assortment of fish and invertebrate animals. Some of the more common fish are white sucker, common shiner, hornyhead chub, bigmouth shiner, fathead minnow and creek chub (appendix E). Game fish such as northern pike and walleye are found in the river and may be locally abundant during spawning migrations. Crayfish, mayflies, caddisflies, snipe flies and fingernail clams are common aquatic invertebrates in the area (appendix F).

2.53 Green and blue-green algae mats covering the rocks in the rapids portion of the pool-riffle association are the main primary producers in both the South Branch Wild Rice River and Felton Creek. Investigators have cited two important communities active in both streams which appear to generate most of the biological productivity. These are the (1) rapids community composed principally of green algae, insect larvae, and several species of fish and (2) the detritus microcommunity inhabited by burrowing

mayflies, clams, snails and chironomid larvae that utilize leaves, bacteria and other organic matter as their energy source. These communities are associated with the natural portions of the stream since each community has rather specific habitat requirements not generally found in ditched reaches.

ANIMAL RESOURCES

2.54 The terrestrial animal of most national concern in the South Branch Wild Rice River and Felton Creek watersheds is the greater prairie chicken (Tympanuchus cupido). This once abundant, prairie-dwelling bird is presently making its last stand in Minnesota, primarily on the remnant prairie stands of the ancient Lake Agassiz beach ridges. It is unofficially listed as a threatened species by the Department of Interior.

2.55 Other important animal communities are those associated with the riparian and bottomland floodplain forests of the South Branch and Felton Creek. These include the woodland birds, mammals, amphibians, and reptiles. Appendices B, C, and D contain a listing and occurrence of some of the common or more important birds, mammals, and reptiles in the Wild Rice River basin.

2.56 Commonly associated with the upland plant communities are raptors, Hungarian partridge, badger, skunk, weasel, deer, fox and meadow voles. Waterfowl, mainly mallard and teal, are common in the potholes. Wood ducks frequent the wooded portions of the two streams.

2.57 One important aspect of the prairie-woodland-stream ecotone is the number and diversity of species of both plants and animals associated with it. The rather abrupt transition from prairie to woodland to stream tends to create an area that supports a community with characteristics additional to those which adjoin the ecotone. In other words species can be found in the ecotone that would not exist in any of the separate communities. This translates in terms of bird populations into some rather impressive breeding pair populations in the gallery forests along the prairie streams. Investigators have found breeding pair figures in the region to range from 100 pairs per 100 acres to over 750 pairs per 100 acres with 300-500 pairs per 100 acres being average (Uvardy 1957, Hibbard 1972).

2.58 Other aspects which have influenced terrestrial and acquatic species are extensive wetland drainage and conversion of prairie to agricultural uses. Thus, the typical prairie species and migratory waterfowl which were once abundant in the area under pristine conditions are now scarce to rare, and in the case of the prairie chicken, threatened with extinction.

2.59 Within the portions of the South Branch and Felton Ditch in the Lake Agassiz plain, the animal resources are limited in population size due to the lack of habitat. The common inhabitants are the thirteen-lined ground squirrel, pocket gopher, striped skunk, meadow vole, killdeer, red-tailed hawk and mourning dove. Mallard, teal and an occasional shore bird such as the spotted sandpiper or great blue heron are associated with the streams as are the belted

kingfisher and wood duck. The ecotone created by the stream, gallery forest, and agricultural field interface is important, first, because it is an ecotone and second, because it represents some high quality wildlife habitat in the midst of an intensely cultivated area. Practices such as fall plowing and annual fall burning of roadside and drainage ditches effectively limit the quantity and quality of habitat in the Red River valley. Hence, the value of the stream side vegetation increases immeasureably in regard to wildlife populations and species diversity.

WATER QUALITY

2.60 The Minnesota Pollution Control Agency has established a water quality monitoring station on the Wild Rice River at the U.S. Highway 75 Bridge near Hendrum, Minnesota. Data are available from this source and generally reflect overall basin water quality since the monitoring station is near the confluence of the Wild Rice River and the Red River of the North. Point sources of pollution to the basin have been identified in the Interim Water Quality Management plan (anon., 1971). Table 1 is a list of the communities which discharge sewage effluents into the Wild Rice or its tributaries. Other sources of pollutants are agricultural runoff and commercial establishments.

TABLE 1

List of communities which discharge sewage effluents into the Wild Rice River or its tributaries

Township and County	Population	Treatment	Receiving Waters
Waubon-Mahnomen	345	Stab pond (Sec)	Spring Creek WRR
Ulen-Clay	486	"	SBWRR
Twin Valley-Norman	868	"	WRR
Mahnomen-Mahn	1,312	"	WRR
Felton-Clay	232	"	Felton D. WRR
Borup-Norman	128	"	Ditch SBWRR
Begou-Mahnomen	157	None	Marsh WRR
Gary-Norman	265	None	Ditch WRR
Ogema-Becker	236	None	Ditch WRR

2.61 Appendix G tabulates water quality data collected by the Minnesota Pollution Control Agency on the Wild Rice River. These data are very limited and reflect the condition of the mainstem of the Wild Rice River only. However, overall water quality of the mainstem would be affected by the pollutants carried in its tributaries. The general water quality condition of the Wild Rice River could be used as an indication of water quality in the South Branch and Felton Ditch. If this were done one could postulate a condition of generally good water quality in the proposed project area except that measurements for certain parameters, notably heavy metals, exceed the standards for waters of this type and indicate water quality problems. Before such a postulation would be valid, however, more data collected at frequent intervals on the South Branch and Felton Ditch would be required.

REGIONAL ECONOMICS

2.62 The upper Midwest region is geographically coincident with the Ninth Federal Reserve District and includes Minnesota, North Dakota, South Dakota, Montana, northwestern Wisconsin and upper Michigan. This region has been the subject of intensive economic analysis begun in 1960 and conducted jointly by the University of Minnesota and the Upper Midwest Research and Development Council. Since 1960 many technical papers and reports have been published by the Upper Midwest Economics Study and have been summarized in published form (Henderson and Krueger, 1965). Some of the important findings and conclusions are as follows:

a. The Upper Midwest economy developed initially because of the abundance of the region's natural resources, i.e., agriculturally productive land, minerals and timber. From this base, support activities such as railroads, the processing of natural resources, home construction and services contributed to the expanding economy. Today, the dependence upon natural resources is declining in importance, but the region as a whole still relies on them and has specialized in activities relating to them.

b. There is a distinct difference in the economy of urban and rural areas in the region. Urban areas have more rapid employment growth, population increases, and more economic and employment specialities.

c. While the Upper Midwest is undergoing an economic transition with increased diversification and less reliance on natural resources, many of the people employed in agriculture and similar occupations are being displaced by technological changes and, until recently, a declining demand for natural resources. The greatest problem and challenge in the immediate future will be the provision of employment opportunities in new fields.

d. The labor force will grow more rapidly than the total population in the next 10 years, and this expanding labor force will be required to have more education, more skills and more specialized knowledge than job seekers of the previous decade.

e. In summation, the Upper Midwest is in transition, becoming more urban, more diversified in its economic base with greater numbers of the population entering a labor market which will demand greater skills and increased specialization in education. Trends indicate that the region will become more like the nation as a whole in terms of its economy, urban-rural balance and dependence upon natural resources.

WATERSHED ECONOMICS

2.63 The South Branch Wild Rice River and Felton Ditch watersheds occupy portions of Norman, Clay and Becker Counties. Norman County is used to describe the social and economic environment of the project area because it is typical of the problem areas in the watersheds. Clay County census data is influenced by the large Fargo-Moorhead urban area whereas Norman County is rural with no population centers in excess of 2,500 people. Becker County, on the other hand, is situated in the morainic hills region of western Minnesota and not in the bed of glacial Lake Agassiz. It is not considered representative of the agricultural economy of the Lake Agassiz area nor does it have the sheet water flooding problem characteristic of the lake bed area.

2.64 Ada, with a 1970 population of 2,076 people, is the county seat of Norman County, population 10,008 (1970 census). Some nine trade nodes have been classified within Norman County ranging from a partial shopping center to a hamlet to serve local trade needs. The entire county is located within the Fargo-Moorhead trade area with Fargo-Moorhead being about 45 miles southwest of Ada. Farming is the primary economic activity in the county, followed by retail trade which supports the agricultural base.

2.65 Agriculture, the primary industry in Norman County, accounted for the use of over 93 percent of all land in 1969. Farm production in Norman County is summarized in table 2 in terms of the value of agricultural products sold. The value of agricultural products sold in the county has risen at a steady rate with an 89-percent increase from 1949 to 1969. The value of crops produced has increased at a faster rate than that of other products sold. A gain of 135 percent between 1949 and 1969 has been recorded. Livestock and dairy products have also increased substantially, 64 and 62 percent, respectively, during the period 1949-1969 while poultry declined by 86 percent during the same period. Table 3 provides county data on crops grown, and production and value of each crop. Wheat, oats and barley are the principal crops both in average and value, accounting for about 70 percent of each. Hay, sugar beets and soybeans accounted for about 22 percent of the crop sales in 1969. During the same period, government farm programs were active on 717 commercial class farms which resulted in payments of $1,787,744 to the farmers.

2.66 The national trend toward larger farms is evident in Norman County where the average farm size changed from 287 acres in 1959 to 496 acres in 1969, an increase of 73 percent.

TABLE 2
TRENDS IN AGRICULTURAL SALES
Norman County, Minnesota
Value of Agricultural Products Sold (In Dollars)

	NORMAN COUNTY					Percent Change 1949-1969
	1949	1954	1959	1964	1969	Norman County
All Products	10,079,940	10,380,217	12,787,445	14,661,029	19,118,816	89%
Average/Farm	5,693	5,105	9,069	11,065	18,019	216
All Crops	5,612,149	6,572,434	8,055,133	8,604,515	13,204,648	135
Livestock (excluding poultry & dairy)	2,397,506	1,734,562	2,873,430	4,113,470	3,931,152	64
Poultry	923,319	865,996	471,417	205,820	126,115	- 86
Dairy Products	1,145,497	1,204,814	1,387,465	1,736,023	1,856,901	62

Source: U.S. Bureau of the Census, Census of Agriculture, Statistics for the State and Counties, Minnesota, U.S. Government Printing Office, Washington, D. C., 1954, 1964 and 1969.

TABLE 3
CROP PRODUCTION
Norman County, Minnesota

	Acres Harvested	Percent of Total Acres	Total Farm Production	Farm Value(a)	Percent of Total Dollars
Corn	15,700	4.1%	392,000 bu.	$ 403,760	2.6%
Wheat	75,500	19.9	3,151,700 bu.	4,223,278	27.2
Oats	105,700	27.8	6,342,000 bu.	3,488,100	22.4
Barley	76,300	20.1	3,815,000 bu.	3,128,300	20.2
Flax	6,400	1.7	64,000 bu.	182,400	1.2
Soybeans	20,800	5.5	353,600 bu.	866,320	5.6
All Hay	38,900	10.3	69,900 tons	1,363,050	8.8
Alfalfa	29,000	7.6	58,000 tons	159,500	1.0
Potatoes	2,700	0.7	337,500 cwt.	506,250	3.3
Sugar Beets	7,300	1.9	81,600 tons	1,183,200	7.6
Rye	1,500	0.4	33,000 bu.	30,360	0.2
TOTAL	379,800	100.0%		$15,534,518	100.0%

Source: Minnesota Agricultural Statistics, 1969, Crop and Livestock Reporting Service, U.S. Department of Agriculture, Minnesota Department of Agriculture, St. Paul, Minnesota, March, 1969.
(a) Calculated from annual average price index.

2.67 During the same period (table 4) the number of farms decreased by 43 percent. Consolidation of farms into large units is indicated by the increase in the number of farms with 500 or more acres. Farms over 1,000 acres in size increased by 256 percent between 1959 and 1969. This trend is doubtless continuing at the present time due to economics of large-scale farms and efficiency factors governing agricultural production.

2.68 Table 5 provides information on the trends in agricultural land values for the period 1954 to 1969. Agricultural land values in Norman County have shown a steady increase throughout the period. The increase in farm land values is partially accounted for by the bidding up of prices by farmers seeking more economical farm units.

2.69 Table 6 provides past population trends for Norman County during the period 1949 to 1970. A steady decline in total county population has occurred during the period. With the exception of Ada and Halstad, all of the villages and unincorporated townships have undergone a general downward trend in population. On the other hand the State as a whole has experienced a steady increase in population. Clay County, which contains the city of Moorhead (part of the regional trade center of Fargo-Moorhead), has experienced a solid population increase while the population in the remainder of the economic area has remained the same or decreased.

2.70 Employment distribution by industrial groups is illustrated in table 7. Agriculture remains the dominant employment, although it decreased significantly during the 1960 and 1970 period. Professional services, manufacturing, wholesale trade, transportation, communications and utilities have experienced growth during the 1960 to 1970 period. Agriculture, mining, construction, retail trade, business and repair services and recreational services have declined during the same period.

LAND USE

2.71 Norman County contains 566,400 acres of land surface or 855 square miles. Six major land use categories have been described for the county. Agriculture is the dominant land-use category and in 1969 accounted for 93 percent of the total land surface. Rights-of-way for Federal, State, county, township and village roads, railroad and transmission lines is the second largest land use category. Residential development, including the urban areas, rural nonfarm and rural farm is the third largest land use category. Public and semipublic property, commercial and industrial property account for the remaining land use in the county.

2.72 Commercial development is restricted mainly to the established communities in the county. The majority of the industrial development is located along the major rail lines and is devoted to agriculturally related industries: grain processing and storage, feed milling and storage, bulk fertilizer and specialized farm produce handling and storage.

TABLE 4
AGRICULTURAL STATISTICS
Norman County, Minnesota

	NORMAN COUNTY					Percent Change 1950-1969
	1950	1954	1959	1964	1969	Norman County
Number of Farms	1,862	1,711	1,469	1,325	1,061	- 43
Acres in Farms	534,467	536,741	502,739	522,367	527,140	- 1
Average Size of Farms	287	313	342	394	496	73
Number of Farms by Size						
less than 10 acres	32	36	27	31	22	- 31
10-49 acres	102	83	77	66	26	- 74
50-99 acres	114	94	79	63	50	- 56
100-259 acres	756	619	481	361	266	- 63
260-499 acres	656	636	525	470	330	- 49
500-999 acres	172	205	232	261	260	51
1,000 acres or more	30	38	48	73	107	256

Source: U. S. Bureau of the Census, Census of Agriculture, Minnesota, U. S. Government Printing Office, Washington, D. C., 1952-1969.

TABLE 5
TRENDS IN AGRICULTURAL LAND VALUES
Norman County, Minnesota

	1954	1959	1964	1969
Dollars per Acre, Norman County	$ 63.00	$ 93.00	$ 118.00	$ 161.00
Dollars per Acre, Minnesota	$ 105.00	$ 154.00	$ 166.00	$ 225.00

Source: U. S. Census of Agriculture, U. S. Department of Commerce, Bureau of the Census, 1964, U. S. Government Printing Office, Washington, D. C.

TABLE 6
PAST POPULATION TRENDS
Norman County, Minnesota

	Percent Change	1940	Percent Change	1950	Percent Change	1960	Percent Change	1970
United States		$ 132,165,000	7.2%	151,326,000	14.5%	179,323,000	19.0%	
Minnesota	11.5	2,792,300	8.9	2,982,482	6.8	3,413,864	14.5	3,804,971
Norman County	11.1	14,746	4.9	12,909	- 12.5	11,253	- 12.8	10,008
Ada	0.6	1,938	50.8	2,121	9.4	2,064	- 2.7	2,076
Borup	- 11.7	NA		NA		145	(a)	128
Gary	1.1	300	- 2.6	278	- 7.3	262	- 5.8	265
Halstad	- 6.4	570	6.5	635	11.4	639	0.6	598
Hendrum	2.0	341	4.6	352	3.2	305	- 13.5	311
Perley	- 9.7	246	6.5	204	- 17.1	165	- 19.1	149
Shelly	16.1	344	11.7	329	- 4.4	310	- 5.8	260
Twin Valley	3.2	844	28.5	899	6.5	841	- 6.5	868
Rural Unincorporated	- 17.9	10,163	- 2.4	8,091	- 20.4	6,522	- 19.4	5,353

Source: U. S. Bureau of the Census, U. S. Census of Population, Minnesota, Number of Inhabitants, U. S. Government Printing Office, Washington, D. C., 1920-1960.
NA - Not Applicable
(a)Cannot be calculated because of the incorporation of Borup in 1951.

TABLE 7
EMPLOYMENT BY INDUSTRIAL GROUPS
Norman County, Minnesota

	1960	1970	Percent of Total
Agriculture	1,864	1,136	35.6%
Mining	8	5	.2
Construction	174	169	5.3
Manufacturing	125	242	7.6
Transportation, Communications & Utilities	130	161	5.0
Retail Trade	444	385	7.3
Wholesale Trade	134	233	12.1
Finance, Insurance & Real Estate	80	95	3.0
Business & Repair Services	98	64	2.0
Personal Services	145	113	3.5
Recreational Services	7	0	0.0
Professional Services	315	429	13.4
Public Administration	116	132	4.2
Industry Not Reported	38	27	0.8
TOTAL	3,678	3,191	100.0%

Source: U. S. Bureau of the Census, U. S. Census of Population, General Social and Economic Characteristics, Minnesota. U. S. Government Printing Office, Washington, D. C., 1952 and 1961

2.73 Public and semipublic land is devoted to churches, schools, county and township buildings and property such as gravel pits and cemeteries. Wildlife management areas account for the largest use of public land in the county. The Marschner vegetation map which was compiled from the notes of the original land surveyors is used as a basis for the original vegetation types in the county (Orning and Maki 1972). According to the map, Norman County has had a 99-percent reduction in 40-acre parcels (forties) predominantly marsh, a 64-percent reduction in forties predominantly forested and a 94-percent reduction in forties predominantly grassland. Data were not readily available for Clay County.

REGIONAL TRANSPORTATION

2.74 Norman County is situated approximately 255 miles northwest of the metropolitan Minneapolis-St. Paul area. The county is served by three north-south highways and two east-west highways. The major Norman County highway is U.S. Highway 75 which roughly parallels the Red River through northwestern Minnesota. As Interstate 29 is developed in North Dakota, certain amounts of traffic from Highway 75 will undoubtedly be served by the interstate, thus reducing the relative importance of Highway 75. Other north-south routes in the county are State Highways 9 and 32.

2.75 State Highway 9 travels through the center of the county in a north-south direction and serves no major communities south of Norman County, but it does serve the communities of Red Lake Falls and Thief River Falls to the north. East-west traffic through the county is handled primarily by State Highway 31. This highway runs from Mahnomen in the east through the community of Ada, on to Halstad, and then joins North Dakota State Highway 7 south which connects with U.S. 81 in Hillsborough, North Dakota. State Highway 113 in the east-southeastern portion of the county extends from Syre on State Highway 32 approximately 8 miles south of Twin Valley in an easterly direction through Waubon in Mahnomen County and terminates at U.S. Highway 7 on the south edge of Itasca State Park.

2.76 The Burlington Northern railroad maintains lines through the South Branch Wild Rice River and Felton Ditch watersheds. Burlington Northern has three sets of tracks: one follows the Red River, handling mostly sugar beets from local stops at Perley, Hendrum, Halstad, and Shelly; another traverses through Ada and Borup; and the third line runs further to the east through Twin Valley and Gary. It should be noted that many of the older settlements in the county are located on the railroads, with each settlement having had, at some time, use for the railroad passenger or cargo service.

2.77 At the present time, Norman County has two public airports located within its boundaries, one located at Ada and the other at Twin Valley. However, neither airport facility is used by passenger airlines.

Anyone wishing airline passenger service would normally use the Fargo, North Dakota airport which is located some 45 miles south of Ada. Both Norman County airports are classified as basic utility airports that can accomodate 95 percent of the existing general aviation type planes.

2.78 Other than the air facilities at Fargo-Moorhead, only one other limited service airport exists at Dilworth, Minnesota.

2.79 Clay County is crossed by a major network of State and interstate highways. The moorhead-Fargo areas are served by Interstate 94 and U.S. 29 which run in an approximate east-west direction across the county. State highways 9 and 32 traverse the county in a north-south direction. These main throughfares are connected by an extensive system of county roads.

2.80 Rail facilities are provided by Burlington Northern Incorporated. Two separate tracks enter Moorhead, one from Hawely and the second from Bonnesville. Other Burlington Northern lines run between Felton and Barnsville, and Ulen to Hawley.

RECREATION

2.81 Recreation facilities in the area are generally quite limited. A nine hole golf course of 63 acres exists near Ada. The city of Ada has three municipal parks with facilities for picnicking and swimming. The village of Halstad owns the 20-acre Halstad Riverside Municipal Park located adjacent to the Red River of the North. Village or community parks exist in most of the other small communities in the county. Wayside rest areas located along the major highways in Norman County account for 23 acres of passive recreational space. Federal and State Wildlife Refuge and Management area holdings as of 1 January 1971 totaled approximately 15,640 acres within the South Branch and Felton Ditch watersheds. These holdings are located in scattered parcels throughout the headwaters areas of these watersheds.

2.82 Local Rod and Gun clubs provide skeet and trap shooting opportunities to county residents. Stream fishing opportunities for northern pike and walleye exist on the Red, Wild Rice and South Branch Wild Rice Rivers. The upper reaches of Felton Ditch are known locally as a brook trout fishery.

2.83 Indications are that the stream fishery resources are not great in the basin and are under-utilized, probably because of the close proximity to the excellent lake fishing of west central Minnesota.

2.84 Canoeing and swimming opportunities exist on the Red and Wild Rice Rivers. Public access points to these streams are limited mainly to bridge crossings.

2.85 Norman County has no national forests, national refuges, State parks, State forests, established historic sites or national landmarks, campgrounds, established horseback or snowmobile trails or marinas. Buffalo River State Park and the Barnsville Wildlife area are located in Clay County.

SCIENTIFIC AREAS

2.86 The Minnesota Chapter of the Nature Conservancy owns two natural areas in Norman County, Frenchman's Bluff and Agassiz Dunes Natural area. Frenchman's Bluff is a 42-acre tract of shortgrass prairie on an elevated gravelly moraine. It is dry grassland typical of the Great Plains much farther to the west. The tract is located about 5 miles southeast of Twin Valley. The agassiz Dunes Natural Area is located about 2 miles southwest of Fertile, Minnesota. Within the boundaries of the tract lie sand dunes and blowouts of marked scenic beauty formed 4,000 to 9,000 years ago. The area lies on the prairie-forest border and possesses characteristics of both ecosystems.

HISTORICAL AND ARCHEOLOGICAL

2.87 Two sites having some historical significance have been located in the Wild Rice River basin. One is the Faith Mill and Dam on the Wild Rice River east of the village of Faith. This is the last of three such flour mills located in Norman County and is reported to be operational. The damsite is used by local residents for swimming and picnicking. The second site is the Heiberg Dam on the Wild Rice River north of Twin Valley. The dam would need to be restored and the area around the site could be developed into a recreation area.

2.88 Two known archaeological sites have been recorded within the Wild Rice River basin. One prehistoric burial mound site has been recorded along the Wild Rice River about two miles below Twin Valley. The second site, a burial mound, is located along the South Branch Wild Rice River about two miles above the upstream limits of the stream modification project in Clay County. Thus, neither of the two known sites would be disturbed by project development. It will be necessary however, to conduct a survey of the affected project areas in an attempt to locate any potential unknown archeological sites before construction work begins. A contract for the necessary investigation is being negotiated with an archeologist recommended by the Minnesota State Archeologist. The work is expected to be completed in autumn of 1974.

2.89 The National Register of Historic Places has been consulted and no sites within the Wild Rice River basin are on the register.

RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

2.90 Land use in the vicinity of the South Branch Wild Rice River and Felton Ditch is not expected to change in the future. No State, Federal, or local land use plans have been formulated to alter the present agricultural status of the area. The lucrative nature of agriculture

in the basin is the prime reason for this. The project, as proposed, would not conflict with present land use practices but would enhance those uses by reducing flood damages by 75 percent. However, the project would commit 314 acres of cropland, pasture, and woodland to a secondary channel and spoil bank area.

3. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

INTRODUCTION

3.01 The recommended project on the South Branch Wild Rice River consists of debris removal from its mouth to mile 1.4, and one side channel excavation where possible from mile 1.4 to mile 8.1 and from 14.2 to 16.0. Excavation of both sides of the channel would be necessary between mile 8.1 and 14.2.

3.02 One-side excavation on Felton Ditch would be done where possible from mile 4.8 to mile 6.0 and mile 8.1 to 8.4. The excavation of both river channel banks would be required on river miles 1.6 to 4.8, mile 6.0 to 8.1, and mile 8.4 to mile 17.1. Clearing of debris only would be conducted from mile 0 to mile 1.6. No channelization work would be accomplished upstream of mile 17.1. However, between mile 17.1 and 19.9 the existing channel would be inclosed by flanking levees, this choice of alternatives preserving a put and take trout fishery.

3.03 A total of 32.9 miles of stream and ditch would be directly affected by the recommended flood control project. Of this total, 6.6 miles represent previously unattended channel that would be adversely affected by debris removal and/or channel bank modification.

3.04 These proposed stream alterations would have various effects on the South Branch Wild Rice River and Felton Ditch watershed area.

GEOLOGY AND GROUNDWATER

3.05 No significant impacts upon the geology of the area would be expected.

3.06 The channel design is based on maintaining existing channel invert grades, and there would be no general deepening of the channel. This would preclude any major impact on groundwater from this feature. Existing farm and lateral ditches should function more efficiently upon completion of this project. This should not cause any substantial effect on area groundwater conditions.

PHYSIOGRAPHY

3.07 If this plan is implemented, additional land along the South Branch of

the Wild Rice River and Felton Ditch would be altered. The total, 314 acres, includes 263 acres of farmland, 25 acres of hay and pasture, 24 acres of natural habitat and about 2 acres of farm windbreak. This additional acreage would be utilized in channel modification, berm construction, and in the spoil desposition.

3.08 Localized changes in physiography would occur by the creation of spoil banks with a 20-foot berm provided between the top of the channel bank and the toe of the spoil bank.

PLANT RESOURCES

3.09 Complete or partial elimination of the existing stream plant communities would occur in the excavation reaches. Only debris removal would be implemented at mile 0 to mile 1.4 on the South Branch Wild Rice River and mile 0 to mile 1.6 on Felton Ditch. The lower 2 miles of both streams possess some well-developed floodplain forest vegetation. This exists as riparian vegetation, in some cases providing a complete canopy for the stream. It is rather narrow in depth due to encroachment from farm fields on both sides. The majority of this habitat would be left untouched. Mile 1.4 to 2.0 on the South Branch would be subject to excavation on one side where possible while miles 1.6 to 2.0 of the Felton Ditch would be excavated on both banks.

3.10 The mid-reaches consisting of miles 2.0 to 8.1 on the South Branch and 2.0 to 6.0 on Felton Ditch contain some intermittent riparian trees and shrubs, sometimes in continuous bands on both sides of the streams. One side excavation where possible would be accomplished on the South Branch, and some selective one side excavation would be needed to save vegetation on Felton Ditch. The areas along Felton Ditch which would be covered by levees have primarily herbaceous vegetation with some scattered woody cover present. The proposed wildlife corridor and vegetative measures such as seeding a mixture of prairie grass would in time replace the lost quality of terrestrial habitat immediately adjacent to the project. Reduced flooding in the project area would alter plant species composition. In uncultivated areas hydrophilic species would be replaced by those plants more accustomed to a drier existence.

STREAM RESOURCES

3.11 Any channelization of a stream is adverse to its biota, even if the stream, or portions of it, exist as a ditch. This is inevitable because the draglines and other equipment used to modify the channel also remove the habitats of the stream biota. Shaping the bottom and sides removes the substrate for both plant and animal life. Such features as pools and riffles, undercut banks, rubble bottoms, snags,

large stones or boulders, and beaver dams are responsible for the habitat of many life forms in a stream. In order to increase hydraulic efficiency, these factors responsible for the habitat diversity of the stream are removed. The construction in the project area would result in the loss of 6.6 miles of relatively natural streambeds and banks. This loss of natural habitat would be considered a severe impact to the aquatic ecosystem in any stream system. However, this loss is even more significant in the South Branch-Felton Ditch area since natural watercourses are somewhat rare, most having been modified years ago. Therefore the loss of more natural waterways is a severe negative environmental impact. Widening of the stream would cause it to become more shallow, and removal of wood vegetation from streambanks would allow water temperatures to rise and fluctuate more widely thereby causing long term adverse impacts on stream biota.

3.12 The environmental effect of reditching would in some aspects be temporary. Some stream reaches would be similar to the present stream, ecologically speaking, within a relatively short time. This would be true in those portions of Felton Ditch and South Branch Wild Rice River which contain only herbaceous vegetation cover and a lack of riparian woody cover or diversified bottom types. These reaches are generally found between mile 8.1 to mile 14.5 on the South Branch and mile 6.0 and mile 17.2 on Felton Ditch. Mile 2.0 to 6.0 on Felton Ditch has limited riparian woody cover in and along the ditch, and thus a limited amount of habitat diversity. This vegetation would be partially eliminated by excavation.

3.13 The lower 2 miles of Felton Ditch and the lower 8 miles of the South Branch are relatively natural prairie-type streams and have a varied assortment of habitat types which is responsible for the diversity of life forms in the streams. Bank modification and debris removal in these reaches would be the cause of irreparable harm to the stream ecosystem. The excavation and ultimate modification of the stream from mile 14.5 to mile 17.5 on the South Branch would remove some of the diversified animal habitats as a means of increasing hydraulic efficiency, thus negatively affecting the stream biota.

ANIMAL RESOURCES

3.14 The removal of vegetation and stream habitat features would be detrimental to terrestrial and semi-aquatic animals. These creatures depend on the riparian cover, the stream and the productivity of the two systems for their sustenance (breeding habitat, cover and food). Most directly affected would be the breeding-bird population which depends upon this cover for reproductive habitat and for the rearing of young. Other creatures such as fox, deer, rabbit, skunk and beaver require the natural vegetation systems for survivial in this intensely farmed agricultural area. In short, the removal of vegetation for the project would place a severe limitation or constraint on the animal populations which would normally be able to occupy the habitat.

The animals' travel corridor would be disrupted where the vegetation is stripped away from the streambanks. This would cause a decrease in animal movement or migration up or down the watercourses at least until vegetation is again firmly established to provide some semblance of cover. Muskrats and beaver which have built dens at various locations along both streams would lose both habitat and food source.

3.15 The long term net impact upon wildlife would depend partly upon the plan of revegetation which is to be developed during Phase II post-authorization studies in cooperation with the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources. The implementation of the wildlife corridor plan would have a beneficial effect on terrestrial wildlife species by increasing the quality of habitat available immediately adjacent to the project. This would be considered a positive environmental impact. The corridor concept, however, would take some time to fully implement and reach its optimum value. The corridor would be generally more valuable to wildlife if it were vegetated with woody plant species rather than with grasses.

ECOSYSTEM

3.16 Well-developed ecosystems are generally found only in the lower few miles of the project area where natural coulee-type drainage exists. In these areas, floodplain-forest vegetation, associated animal populations, and natural streams exist in close proximity and form an important ecotone. The remainder of the excavation reaches have been greatly disturbed in the past and are biologically less valuable. Ecosystem integrity would be disrupted and would be unavoidable, while the significance of this disruption would be greatest in the more natural areas. The periodic enriching effect of floods up to the magnitude of the percent flood would be precluded.

SOCIAL

3.17 The proposed project would reduce flood damages to 109 residences and farmsteads. The persons who live in these areas would experience less rural community disruption and threats to public health and safety during flood periods. Human misery would also be reduced, although these social effects would hold only for the more frequent floods since large floods would still inundate the area. Those individuals owning a total of 314 acres of land adjacent to the two streams would have to sell property necessary for the project. Providing the lands, right-of-way and easements necessary for project construction is the responsibility of the local sponsor, the Wild Rice River Watershed District. In acquiring real property, the sponsor would be guided to the greatest extent practicable under State law and by the land acquisition policy in Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Estimates will be based on estimated fair market value.

In any event, the loss of agricultural land by individuals owning property adjacent to the streams is an adverse social effect of the project. No persons would be displaced by the project as now conceived.

3.18 Property owners on the main stem Wild Rice River have expressed concerns about the possibilities of increased flows on the main stem due to this project. This is a characteristic concern of individuals in this type of a watershed, since downstream landowners tend to blame the upstream landowners for letting too much water come down too fast, resulting in overbank flooding. However, in the case of this project detailed hydrologic investigations indicate that the recommended project would benefit the downstream rural areas to a minor degree through a reduction in peak flow due to the change in synchronization of flows from the tributary streams.

ECONOMIC

3.19 The primary benefits of this plan are economic advantages to the agricultural lands in the flood-prone area. By providing for better drainage and reduced flooding, earlier planting dates are available during some flood years and crop losses are cut by the reduction in frequency and severity of summer floods. Other economic benefits expected to accrue from the project are through reduced flood damage costs on public roads and bridges. The direct economic beneficiaries are 109 landowners in the flood-prone area. Secondarily, the county taxpayers benefit from decreased road and bridge maintenance costs.

3.20 This plan would require 314 acres of land in addition to the present channel and bank areas along affected reaches of the South Branch Wild Rice River and Felton Ditch. The considered plan is economically feasible. The average annual benefits and costs are estimated at $543,000 and $123,000, respectively, resulting in a benefit to cost ratio of 4.41 to 1. The plan would reduce average annual flood damages by about 75 percent on 96,500 acres of agricultural land. The remaining average annual damages would be about $183,000.

3.21 The general American taxpaying public will pay for $2.3 million of the $2.6 million in project costs.

AESTHETIC

3.22 Major changes to the aesthetic characteristics of the area are not expected as the project essentially involves the enlargement of existing ditches. In the Red River Valley ditches are a common sight, and they occur at about every section line in the basin. Natural prairie streams and rivers are not numerous and to some would appear to be out of place while others would cherish them. A system of man-made ditches is undoubtedly aesthetically preferable to a portion of the population while others would consider the lack of natural waterways a blight to the landscape.

The channels associated with the proposed project would be much larger than most of the ditches in the area, however.

3.23 The project would result in the loss of 6.6 miles of relatively natural streams. These stream miles located on the South Branch Wild Rice River and Felton Ditch would be subject to channel improvement and bank excavation. The loss of vegetation and a portion of the natural stream, in an area where little natural waterway exists, could be considered a major impact to the aesthetics of the area.

3.24 However, in establishing the recommended channel works, consideration was given to avoiding, as much as possible, those areas having the most fish, wildlife, and aesthetic values. As a result, channel excavation work would be restricted as much as possible to one bank only, in areas where the drainage courses support wooded cover. Channel modifications in the lower 1.4 miles of the South Branch and 1.6 miles of Felton Ditch would be limited to debris removal only. Channel enlargement work on Felton Ditch would be terminated at mile 17.1 to prevent destruction of an existing trout fishery. Snagging and clearing for the upper reaches of the South Branch were proposed in the Interim Survey Report. This was changed to one-bank channel excavation to reduce the need for clearing of woody vegetation on the stream banks.

3.25 The channel bottoms, side slopes, berms, and channel side of spoil banks would be planted to a mixture of native short prairie grass. This action would result in at least partially mitigating the visual impact of the spoil banks and construction area.

3.26 Other actions such as shrub planting along the berms, channel, and spoil banks, if implemented, would improve the aesthetics relative to a non-landscaped project.

ARCHEOLOGY

3.27 At the present time there are no known archeological sites within the project area. However, according to the Minnesota Historical Society such sites could occur along the South Branch and Felton Ditch banks. A thorough survey of the project area will be conducted prior to initiation of construction in an attempt to locate any unknown archeological sites. (See also the comments and responses in section 8 of this statement).

WATER QUALITY

3.28 Temporary turbidity and sedimentation could be expected as a result of the project, the amount depending upon unpredictable factors such as streamflow and rainfall during time of construction. Although suspension of sediments in the water is temporary, the resultant siltation on downstream areas is permanent for practical purposes.

3.29 Widening of the stream would cause it to become more shallow, and removal of woody streambank vegetation would allow water temperatures to rise and fluctuate more widely, thereby causing long term adverse impacts on stream biota. This comparison is mainly applicable to unchannelized versus channelized streams, and the existing condition of the streams in the project reaches would cause these effects to be of lesser importance than normally associated with channel modifications.

4. ADVERSE ENVIRONMENTAL EFFECTS

4.01 The turbidity and sedimentation associated with channel enlargement projects are effects that cannot be avoided, as are the long term effects on the stream's thermal regime,as noted above. In order to increase hydraulic efficiency, streambank vegetation would be stripped away and the bottom of the stream or ditch would be enlarged and shaped.

4.02 If the project is implemented, land would be sacrificed for the enlarged channel as well as for spoil disposal areas, which in this case are adjacent to the channel. A total of 314 acres, in addition to the present channel and bank areas along the South Branch and Felton Ditch, would be required for the implementation of this project. The additional lands would include 263 acres of cropland, 25 acres of hay and pasture, 24 acres of natural habitat, and about 2 acres of farm windbreak. These lands would remain altered for as long as the project is maintained, and the dedication of this land to project purposes would be an adverse effect for the individuals involved for as long as the project is maintained.

4.03 Animal populations and diversity are adversely affected by the removal of vegetation and habitat in the stream. In the case of the ditched portions of these two streams, this is not considered an overwhelming effect since the present faunal populations are limited, largely because of past ditching. However, removal of woody streambank vegetation would be adverse. In the reaches of the two streams where the natural coulee drainage is evident, the magnitude of the effect would be greater because of the loss of existing habitat diversity. In these sections it would be preferable from a natural resource conservation standpoint to do nothing to the streams. The loss of 6.6 miles of relatively natural stream bed in an area where few such waterways exist can be considered a severe impact to the environment. A reduction of aquatic biomass can be expected. Vegetation elimination, either partial or complete, along these sections of the two project streams would have adverse impacts on the terrestrial ecosystem of the region.

4.04 The periodic enriching effect of floods up to the magnitude of the 6 percent flood would be precluded.

4.05 Excavation of the stream banks could disturb yet undiscovered archaeological sites.

4.06 The project would have unavoidable aesthetic impacts depending upon one's point of view.

5. ALTERNATIVES TO THE PROPOSED ACTION

NO ACTION

5.01 The no action alternative would be a desirable plan to accept from the environmental standpoint since the environmental quality of the area would not be affected. The stream banks, channels, and the 263 acres of farmland necessary for the proposed plan would be left unaltered, thus precluding the negative impacts of the project. Also under this alternative local interests and the Federal Government would be relieved of the financial burden of implementing flood protection.

5.02 This alternative, however, does nothing to lessen the impact of flood damage in the basin. Average annual flood damages would still cost the farmer and the Federal Government approximately $726,000 annually while about 96,500 acres of cropland would be periodically inundated by floods up to the magnitude of the 6 percent flood. Soil erosion, damage to houses, barns, outbuildings machinery, and stored crops would continue to occur if no action were taken.

NONSTRUCTURAL MEASURES

5.03 Nonstructural flood control measures can often be effective in reducing flood related damage in an area. Five nonstructural measures were considered for the South Branch and Felton Ditch watershed. They included: (1) flood warning and emergency protection; (2) permanent floodplain evacuation; (3) flood proofing; (4) flood insurance; (5) flood proofing and floodplain regulation.

ALTERNATIVE 1 - FLOOD WARNING

5.04 Flood warning measures consist of the prediction of the magnitude and actual time of a flood. Such predictions are of value only if there is sufficient time between the forecast and the flood to allow for the evacuation and/or erection of emergency flood protective measures in an affected area. Presently the National Weather Service and the St. Paul District, Corps of Engineers provide flood forecasting and warnings via the news media. Such a warning system is generally very effective in predicting the spring snowmelt type flood, although flash flooding resulting from extremely heavy rainfall cannot be accurately predicted and flood damages would occur. However, very high flows would cause damages even after implementation of any of the plans considered, although the levels of river stages and flood damages would vary somewhat among the plans.

5.05 The implementation of this nonstructural alternative would have no effect on the environmental integrity of the floodplain area as no stream or bank modification would be necessary. The economic conditions and social well being of the floodplain residents would not be altered from their present status. Flood warning and emergency actions could alleviate less than 1 percent of the estimated total flood damages; therefore, flood damages in excess of $720,000 annually would be expected. The floodplain residents would still be subject to the anxieties and

worries related to the flood season as well as the damages incurred.

5.06 Flood forecasting and flood warnings should be considered an important feature of flood protection and a supplement to any plan for the floodplain. However, this method alone cannot solve the flooding problems experienced in most flood-prone areas.

ALTERNATIVE 2 - FLOODPLAIN EVACUATION

5.07 As formulated, floodplain evacuation would involve the relocation of 109 farmsteads from the 4 percent floodplain, including residents, outbuildings, and stored crops, but not the conversion of cropland from agricultural land use to less flood susceptible land use. In order to implement this floodplain evacuation program, it would be necessary to move the residents and their belongings an average distance of 9 miles eastward into the escarpment area. This plan was found to have benefits and costs estimated at $96,000 and $375,000, respectively, which represents a benefit-cost ratio of 0.26 to 1.

5.08 An estimated 474 acres of land would be required to relocate the affected floodplain residents. Of this total 237 acres would be cropland and 237 acres would be grassland pasture in the Agassiz beach ridge area. Grassland areas in this region are the major habitats of the northern greater prairie chicken, a bird which has been unofficially classified as "threatened" by the U.S. Department of the Interior. Loss of grassland habitat in this area should be considered a major environmental impact and would superficially make this alternative seem unacceptable from an environmental viewpoint. However, this impact would be contingent upon relocation into the grassland and therefore need not occur. It has been noted that in many instances when farms are sold for various reasons (e.g. condemnation procedures for the public good) the former occupants do not return to farming. However, in the case of floodplain evacuation, only the farmsteads would be purchased and subject to relocation. Therefore, land use would not be significantly altered on the heavily farmed floodplain.

5.09 Floodplain evacuation is unacceptable to local interests. It is felt that rural community cohesion would be disrupted and sociological ties broken, although under the plan as conceived the residents would essentially be more closely grouped into a small rural community. It is also felt that the agricultural business of the project area of the region would be greatly affected by the increased distance which a relocated farmer would travel to and from his fields.

ALTERNATIVE 3 - FLOOD PROOFING

5.10 Flood proofing includes a combination of structural modifications and adjustments to reduce the economic loss during a flood period. Such measures might include proper anchorage of structures, timber treatment, protective

coverings, permanent closures, watertight caps, sewer or septic tank adjustments, door and window sealing, and local farmstead protection. These measures are most applicable to new construction and are only a few of the possible measures that can be taken in order to flood proof a property.

5.11 Most structures that are in part submerged eventually experience seepage. Flood duration is an important variable where the seepage factor is concerned. Because of this, coupled with the damage to the cultivated fields, this plan would reduce the total annual loss by only 2.8 percent. Average annual remaining damages would approximate $706,000.

5.12 Flooding would continue to occur, disrupting the lives of the floodplain residents as has been the case, and probably will be, for many years. With this alternative transportation and field access would be periodically interrupted and the possibility of contaminated water supplies exists. The residents would benefit primarily from the reduction of damages to structures and their contents due to the implementation of this plan.

5.13 The biological portions of man's environment would not be affected adversely if this alternative were to be undertaken, as the only modifications necessary would be to the floodplain farm structures.

ALTERNATIVE 4 - FLOOD INSURANCE

5.14 The National Flood Insurance Program was created to curb the continually increasing annual losses from flood damage and was intended to be an alternative to structural programs and to be a method of reducing direct Federal disaster relief. For structures already existing in the floodplain, a high percentage of the premium is paid by the Federal Government. When necessary engineering data become available (see paragraph 5.19), actuarial rates are established, and new structures would be insured at the actuarial rates. Coverage can also be obtained on contents of the buildings, and higher coverage than prescribed by regulation is available at actuarial rates. Unsubsidized crop insurance is also available under the Department of Agriculture Federal Crop Insurance Program. (Except where noted, this discussion of flood insurance pertains to damages to structures and contents, not to damages to crops which constitute the principle flood damages in the watershed.)

5.15 Although it does not prevent flood damages from occurring in the short term, flood insurance would assist property owners in recovering from flood damages. One of the major problems with this alternative is a general unwillingness of property owners to participate in the program, and in the project area only a few residents are taking advantage of the available insurance program. The lack of acceptance is due to the nature and intent of the program. The payment of insurance premiums would in many cases be prohibitively expensive. The intent of the actuarial rates is to internalize the economic risk of floodplain development, that is, make those who develop in the floodplain pay the full costs of that

development (instead of having Federal subsidies through some other type of program such as disaster assistance or structural flood damage reduction). In order to participate in the program, the local unit of government must adopt appropriate floodplain regulations, and thus alternative 5 must be a part of this plan. Actuarial rates for new structures damageable by a 1 percent flood would theoretically not be applicable, then, since the regulations should prevent such damageable construction. Incentive for participation in the program when constructing new structures is strong since flood insurance is required for Federal or Federally-related financial assistance for any building located in areas identified by the Department of Housing and Urban Development (HUD) as having special flood hazards (i.e., in areas on a HUD flood hazard map or, when engineering data are available for delineation, within the 1 percent floodplain.)

5.16 Based on current actuarial rates and subsidized limitations, the cost for complete flood insurance coverage (including unsubsidized crop insurance) for the 4-percent floodplain would approximate $352,000 annually with Federal and non-Federal annual costs of $107,000 and $245,000, respectively. Average annual damages of $726,000 would remain during the period of analysis.

5.17 The economic and social impacts for residents of the floodplain would probably be great under this plan since it would internalize the costs of floodplain development more than any other plan. The public not residing in the floodplain would corresponding experience the smallest adverse social and economic impacts with this plan. The small impacts for the larger public would be due to the nature of the program which, for example, does not allow Federal disaster relief for insured properties. This would reduce Federal costs to Federal subsidy of insurance payments until the existing structures became obsolete and were replaced, at which time Federal participation would theoretically end. Therefore, this plan could be very acceptable to the larger non-resident public. The impacts of this alternative on floodplain ecosystems would be non-existent unless or until floodplain land use changed. Because the recommended plan would not provide protection against the 1 percent flood, this alternative would be applicable regardless of project construction.

ALTERNATIVE 5 - FLOODPLAIN REGULATION

5.18 Floodplain regulations are designed to modify land use and development in order to lessen the future effects of floods. Such measures require adoption and use of legal tools by local governmental units to control the extent and type of development permitted on the floodplain. This approach is in general agreement with the goals expressed by the Federal Flood Insurance Program, the Water Resources Council report, and the courts (Kusler and Lee 1972). Included in these goals are minimizing public expenditures, protecting life, and preventing or reducing flood damage to property. Restricted land use in flood-prone areas can be a major factor in reducing the economic impact of flooding.

5.19 Floodplain regulations are not yet in effect for the project area.

However, if and when the necessary engineering data are available, local units of government must draft the appropriate regulations under State law. The Corps of Engineers study would not generate the data needed.

5.20 The two areas of thrust of the regulations would be: (1) preventing backwater effects of more than 0.5 foot during a 1 percent flood, assuming other encroachments in the floodplain. (A floodway would not be designated but rather the evaluation would be on a case by case basis); (2) preventing damages to new structures by, for example, requiring construction to be on sites raised above the level of the 1 percent flood.

5.21 The regulations would aim at preventing damages to structures and contents, and crop damages would be reduced only to the extent that farming is discouraged in the floodplain in the long term. Under this plan, yearly damages to crops and existing structures of approximately $707,000 would remain, and about 2.6 percent of the estimated annual damages would be alleviated. Due to the highly productive and profitable nature of floodplain farming in the basin, no long-term shifts away from agricultural land use can be foreseen.

5.22 Because the recommended plan would not provide protection against the 1 percent flood, under State law floodplain regulations would be drafted regardless of project construction.

STRUCTURAL MEASURES

5.23 Structural measures applicable to the flood problems in the South Branch and Felton Ditch watersheds fall into three main categories: levee-floodway system, channel modifications or diversions, and upstream reservoir storage. Significant flood damage reduction could be accomplished by these alternatives, singly or in combination. Plate 3 indicates the location of each structural alternative.

PLAN 6 - LEVEE AND FLOODWAY SYSTEM

5.24 This alternative would consist of a leveed floodway along the South Branch Wild Rice River from mile 1.4 to mile 16.0 and a similar leveed floodway along Felton Ditch from mile 1.6 to mile 19.9. The lower 1.4 miles and 1.6 miles of the South Branch and Felton Ditch, respectively, would require debris removal only, because the existing channel can adequately convey more than a 10-year frequency flood flow. The floodway width between levees would range from 200 to 400 feet on the South Branch and from 250 to 400 feet along Felton Ditch. The levee heights would range from 2 feet to 5.5 feet and the side slopes would be approximately 3 to 1; therefore, the base width of the levees would range from 22 feet to 43 feet. The levees would contain the 10-year flood and more frequent floods with about 2 feet of freeboard. This would require acquisition of 1,172 acres including 1,063 acres of cropland, 17 acres

of wooded pasture, 8 acres of grassland pasture, 3 acres of windbreaks, 8 acres of bottomland hardwood, 56 acres of farmsteads and 17 acres of brush.

5.25 The flanking levees required with this plan would inclose about 189 acres along about 6.6 miles of relatively natural stream reaches; 201 acres along 7.5 miles of stream reaches which have been subject to channel enlargement in the past; and 782 acres along 18.8 miles of stream reaches which are presently classed as legal drains. The plan would require clearing 1 acre of low woodland and 1 acre of windbreak to make way for the levees; the remaining 26 acres which support woody vegetation and are required for the floodway would not be directly affected. The remaining lands including areas occupied by cropland, farmsteads, and pasture would be converted to grassed channel and brush areas as part of the leveed floodway. The plan would benefit agriculture on 96,500 acres of land by reducing total estimated annual damages by 34.7 per cent. Remaining average annual damages would approximate $474,000. This plan is the most expensive plan considered with an estimated first cost of $20.8 million. The benefit to cost ratio is 0.28 to 1. In addition, purchase of 1,063 acres of highly productive agricultural land, its removal from production, and the relocation of 14 farmsteads and residences would be unacceptable to local interests.

5.26 This plan would provide some environmental benefits as regards biological systems because the required agricultural lands would be maintained as grassed floodway and levee slopes and because significant clearing of existing natural wooded and brushy habitat in the floodway would not be required. The biological benefit would be enhanced by planting of native prairie grass species in lieu of the standard mixtures of brome and bluegrass used in the past. This plan would also allow for some continued natural recovery of aquatic biological systems along the "ditch" and channelized reaches of streams (26.3 river miles); however, the potential for development of solid stands of woody vegetation immediately adjacent to streambanks (where it performs a variety of significant biological functions) would be precluded because of requirements for maintenance of the floodway channel. The net biological effect is not predictable at this time for two reasons: (1) Procurement of earth for levee construction could cause substantial environmental impacts. (2) Reduced flooding behind the levees may cause more intensive agricultural use or changes in types of crops with resultant adverse impacts on wildlife. If this were to occur, there would be a large block of high quality habitat within the floodway while habitat quality on the much larger area behind the levee would be reduced. Since optimal wildlife production requires interspersion of habitat types, the net effect would be decidedly adverse. However, this effect would apply to any of the alternatives which are economically advantageous to the floodplain farmer.

PLAN 7 - 9-MILE-LONG, LOW-EARTH DAM

5.27 This alternative would consist of a 9-mile-long, low-earth dam at mile 18.2 on Felton Ditch. A diversion channel would extend from about mile 18.5 on the South Branch Wild Rice River to the reservoir. Felton Ditch would be enlarged for about 2 miles below the dam to carry reservoir outflow. The reservoir and channel are sized to control a 15-year frequency flood at the damsite.

5.28 This alternative would require 4,880 acres of land including 3,987 acres of cropland, 496 acres of pasture, 16 acres of farmsteads, 18 acres of roads, 29 acres of windbreaks, 25 acres of bottomland woods, 15 acres of marsh, the 250-acre State of Minnesota Felton Wildlife Area, 1 acre of low-flow water surface and 4 acres of secondary channel and bank area along existing drainage ditches, and 13 acres of low-flow water surface and 26 acres of secondary channel and bank area along existing intermittent streams.

5.29 Of the total required lands, 1,500 acres would be permanently inundated as a conservation pool and would be converted to interspersed wetland and marginal fish lake. Permanently inundated lands would include 1,429 acres of cropland, 25 acres of farm windbreaks, 8 acres of farmsteads, 10 acres of roads, 5 acres of low woodland, 8 acres of the Felton Wildlife Management Area, and 5 acres of low-flow water surface and 10 acres of secondary channel and bank along small, intermittent, spring-fed streams.

5.30 The remaining 3,380 acres would be above conservation pool elevation and would be subject to inundation during periods requiring floodwater storage. Lands subject to intermittent inundation would include 2,558 acres of cropland, 496 acres of pasture, 8 acres of farmsteads, 4 acres of farm windbreaks, 8 acres of roads, 20 acres of bottomland woods, 15 acres of wetlands, 242 acres of wildlife management area, 1 acre of low-flow water surface and 4 acres of secondary channel and bank area along 0.4 mile of Felton Creek within the area of the trout fishery, and 8 acres of low-flow water surface and 16 acres of secondary channel and bank area along 3 miles of small, intermittent streams.

5.31 The plan would benefit agriculture on 96,500 acres of land by reducing total estimated annual damages by 46.8 percent. Remaining average annual damages would approximate $386,000. The benefit to cost ratio of this alternative is 0.79 to 1. The requirement for over 3,000 acres of agricultural land would not be acceptable to local interests because it would tend to reduce agricultural income and tax base.

5.32 The biological changes associated with this project would be most striking in the 1,500-acre conservation pool where mostly agricultural land would be converted to a mix of wetland and marginal fish lake. The conservation pool would provide substantial wildlife benefits; however, a significant percentage of the low flows of the South Branch and Felton Creek would be required to maintain a permanent pool (average annual evaporation loss in this area is about 35 inches per year). The loss in low flow would have adverse impacts upon the biological systems in the streams.

5.33 The biological impacts on the remaining 3,380 acres of land above the conservation pool would depend, in part, upon the frequency and duration of flooding. However, about 3,058 acres of this would most probably be converted to grassland which could be managed for both wildlife and grazing on a multiple-use basis. The remaining 322 acres of intermittently inundated lands would include 242 acres of the Felton Wildlife Management Area, 50 acres of secondary channel and bank area

along the 3-mile-long diversion channel, and about 30 acres which would be converted to project structures.

5.34 The net biological effects could be positive with this alternative, based on the conversion of about 4,500 acres of agricultural land to higher quality wildlife habitat. Considering waterfowl hunting and furbearer trapping, the conservation pool would provide considerable local recreation benefits. The threatened northern greater prairie chicken which occur in scattered flocks along the Agassiz beach ridges could benefit by this alternative because of the partial conversion of 4,500 acres of agricultural land to wildlife habitat. Some prairie chicken habitat, however, would be lost within the area inundated by the 1,500-acre conservation pool. These judgments are contingent upon induced changes in agriculture in the basin, changes which are not predictable at this time.

PLAN 8 - THREE UPSTREAM RESERVOIRS

5.35 This alternative would consist of two reservoirs on the South Branch Wild Rice River at mile 20.7 and mile 25.4 and a third reservoir on Felton Ditch at mile 21. The combined maximum reservoir storage capacities of these sites would only provide protection from floods of less than 10-year frequency.

5.36 This plan would require 860 acres of lands including 178 acres of cropland, 40 acres of farmsteads, 3 acres of roads, 571 acres of bottomland woods, 12 acres of conifer bog, 9 acres of wetlands, 16 acres of low-flow water surface and 31 acres of secondary channel and bank area along existing streams which are in a relatively natural condition.

5.37 Benefits and costs are estimated at $209,000 and $303,000, respectively, which represents a benefit-cost ratio of 0.69 to 1. The plan would reduce flood damages by about 29 percent on 96,500 acres of agricultural land, and remaining average annual damages would be about $517,000.

5.38 This alternative would result in three conservation pools totaling 378 surface acres which would be suitable for wildlife and fishery management. However, the lands cleared for the conservation pools would consist of 245 acres of woods along the valley bottom and slopes, 47 acres of cropland, 12 acres of conifer bogs, 9 acres of marshland, 16 acres of farmsteads and 2 acres of roads. Since the valley woodlands are of considerable value to wildlife, especially to wintering deer, this alternative would probably reduce the carrying capacity of the valley and adjacent areas for deer as well as other wildlife unless an effective plan of mitigation were undertaken simultaneously with the project.

5.39 In addition to the direct effects of the conservation pools, an additional 115 acres of bottomland woods would be cleared to an elevation of about 3 feet above the conservation pools and in the vicinity of the reservoir embankment. Another 195 acres of wooded wildlife habitat along valley slopes would be subject

to intermittent inundation for short periods during floodwater retention. These woodlands would probably not be inundated for sufficient periods during the growing season to result in a major loss of trees; however, the species composition would probably tend to shift toward a greater dominance of forms more tolerant of flooding over a long period. Accordingly, this plan, although socially acceptable, is clearly not economically feasible and would require conversion of valuable terrestrial wildlife habitat to aquatic systems.

PLAN 9 - CHANNEL MODIFICATION

5.40 This alternative is identical to the recommended plan except that the channels of the South Branch Wild Rice River and Felton Ditch would be modified to contain only the 10-year and more frequent floods, rather than a 6-percent frequency flood. The work to be accomplished along each reach of stream would be similar although the sizing would differ.

5.41 Impacts on the human environment have been described elsewhere in this statement. For details on how economic data and acreages would compare with the recommended plan, the reader is referred to Appendix H.

PLAN 10 - CHANNEL MODIFICATION PLUS DIVERSION OF FELTON DITCH

5.42 The plan includes 16.1 miles of flood diversion ditches to the Red River of the North from mile 8.1 and mile 10.6 of Felton Ditch; enlargement of Felton Ditch between mile 10.6 and mile 17.1; and levees along Felton Ditch from mile 17.1 to mile 19.9. The South Branch Wild Rice River would be modified as in the selected plan. The diversion ditches would follow the alignments of existing county ditches Nos. 6 and 14. Implementation of the plan would require 26 bridge modifications and could adversely affect a cemetery located along County Ditch No. 14. Most of the bridge modifications would consist of new bridges to replace existing culverts. This plan would provide for containment of a 10-year flood. This alternative would require 558 acres of lands including 524 acres of cropland, 13 acres of wooded pasture, 6 acres of grassland pasture, 1 acre of farm windbreaks, 2 acres of bottomland woods, and 12 acres of brush.

5.43 Benefits and costs are estimated to be $440,000 and $175,000, respectively, for a benefit to cost ratio of 2.5 to 1. Total costs of this alternative, however, are $1.9 million greater than total costs of the selected plan. Flood damages would be reduced by about 61 percent on 96,500 acres of agricultural land. Remaining average annual damages would be $286,000.

5.44 About 18 acres of low-flow water surface area and 36 acres of secondary channel and spoil bank area along 6.6 miles of streams in a

relatively natural condition would be converted to a channelized stream condition. The modification to the 6.6 miles of relatively natural streams would result in disruption of the aquatic biological system of mostly algae, aquatic invertebrates, and small fish. The secondary channel and bank area along 32.8 miles of drainage ditches could be increased by 495 acres. Development of wooded and brushy corridors along affected reaches of streams and ditches could result in gains in high quality terrestrial wildlife habitat immediately adjacent to the project.

PLAN 11 - CHANNEL MODIFICATION PLUS DIVERSION OF SOUTH BRANCH WILD RICE RIVER

5.45 This plan includes a 6.7 mile diversion channel from mile 8.1 of the South Branch Wild Rice River to the Wild Rice River and enlargement of the South Branch Wild Rice River channel from mile 8.1 to mile 16.0. The diversion channel alignment would follow the alignment of about 2.6 miles of roadside ditch and 4.1 miles of natural surface drains leading to the Wild Rice River. The plan would require 14 bridge and road crossing modifications. These modifications are scaled to provide protection from the 10-year and more frequent floods. Felton Ditch would be modified as in plan 9.

5.46 This alternative requires 283 acres of land including 247 acres of cropland, 14 acres of natural surface drains, 5 acres of wooded pasture, 1 acre of farm windbreaks, 11 acres of low brush, and 5 acres of bottomland hardwood.

5.47 The plan is economically feasible with estimated benefits and costs of $440,00 and $114,000, respectively, resulting in a benefit cost ratio of 3.9 to 1. Total costs of this plan would be $2.4 million. Flood damages would be reduced by about 61 percent on 96,500 acres of agricultural land, and remaining average annual damages would be $286,000.

5.48 The environmental impacts of this alternative are similar to those described for plan 9 and 10. About 10 acres of low-flow water surface and 21 acres of secondary channel and bank area along 4.1 miles of relatively natural streams would be subject to channel enlargement. Of the 4.1 miles, however, about 2.9 miles have only intermittent stream flow and serve mainly as agricultural surface drains. The secondary channel and bank area along 6.6 miles of stream reaches which have been subject to past channel modification would be increased by about 62 acres. Secondary channel and spoil bank areas along 18.8 miles of existing legal drains would be increased by about 161 acres. An additional 44 acres of secondary channel and bank area would be created along the 3.8-mile diversion channel. As with plan 9 and 10, this alternative could result in an increase in high quality terrestrial wildlife habitat immediately adjacent to the project with planting of wildlife cover along the affected stream reaches.

PLAN 12 - CHANNEL MODIFICATION AND THREE UPSTREAM RESERVOIRS

5.49 This alternative consists of the three reservoirs described as plan 8 combined with a somewhat reduced scale of channel modifications as described in the selected plan. This plan was scaled to provide a degree of flood protection equivalent to that provided by plan 10. This combination plan would require 1,036 acres of lands including 326 acres of cropland, 4 acres of pastured grassland, 10 acres of pastured woodland, 40 acres of farmsteads, 3 acres of roads, 585 acres of woodlands along river bottoms and valley slopes, 12 acres of conifer bog, 9 acres of wetlands, and 16 acres of low-flow water surface and 31 acres of secondary channel and bank area along existing streams.

5.50 This alternative is economically feasible with benefits and costs estimated at $440,000 and $366,000, respectively, and a benefit to cost ratio of about 1.2 to 1. Flood damages would be reduced by about 61 percent on 96,500 acres of agricultural land, and remaining average annual damages would be $286,000. The reservoirs would inundate 31 acres of secondary channel and bank area and 16 acres of low-flow water surface along 7.4 miles of existing natural stream reaches. An additional 27 acres of secondary channel and bank area and 13 acres of low-flow water surface area along 6.6 miles of existing natural stream reaches would be modified by channelization. The channel modifications would also result in an increase of 58 acres of secondary channel and bank area along 7.5 miles of streams which have been previously subjected to channel enlargement. The secondary channel and bank area associated with 18.8 miles of existing legal drains would be increased by 118 acres. The 378 acres of standing water conservation pools would require clearing and inundation of 245 acres of woodland, including wintering habitat for deer. An additional 115 acres of woodland would be cleared above conservation pool elevation, and 195 acres of wooded area would be inundated during periods of flood storage.

SCALE OF DEVELOPMENT

5.51 Channel modifications on the South Branch of the Wild Rice River and Felton Ditch (plan 9) was selected as the plan most feasible for the project area.

5.52 In order to choose the degree of flood protection, the trade-offs among national economic development, environmental quality, and social well-being were analyzed for four levels of flood protection. Channel design capacities which provide protection for floods with estimated 20 percent, 10 percent, 6 percent, and 5 percent frequencies of occurrence were utilized in the analysis. Appendix H compares the economic, social, and environmental impacts of the selected plan for those scales of development. The 6 percent design frequency plan, which provides the maximum excess of economic benefits over costs, was eventually chosen for the proposed project. Floods which exceeded the project freeboard would inundate the "protected" area. However, this would be true of all the alternate plans considered, although the levels of river stages and flood damages would vary somewhat among the plans.

6. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

6.01 Implementation of the proposed project would result in a reduction in the periodic enriching effect of floods up to the 6 percent flood, and this would be contrary to long-term productivity. The loss in productivity would be traded for the immediate economic benefits of reduced flood damage. The distinction must be drawn here between reduced basic productivity and project-induced increased yield which the farmer would realize in his lifetime through reduced flood losses.

6.02 Short-term benefits would consist of the removal of the adverse economic and social impacts associated with floods up to a 6-percent frequency flood. It is probable that the project would be maintained beyond the assumed economic life, or as long as it was needed, and consequently would have a long term effect on the area's productivity.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION

7.01 Energy from hydrocarbon fuels expended during the construction phase of the project as well as planning efforts are irretrievable resources which would necessarily be utilized. Conversion of the natural channels into man-made ditches or channels essentially represents an irreversible use of a resource unless the measurement of time is in geologic terms. This loss includes 6.6 miles of natural stream and its related wildlife, and 263 acres of agricultural land, 25 acres of hay and pasture, 24 acres of natural habitat, and about 2 acres of farm windbreak. Any natural resources used during the construction phase of the project would also be irretrievable.

8. COORDINATION WITH OTHER AGENCIES AND INTERESTS

8.01 Coordination has been maintained between State, Federal, and local interests throughout the course of the project formulation. Federal and State agencies have been kept informed concerning project phases that would affect their interests.

8.02 Extra efforts at coordination with the citizens within the Wild Rice Watershed District were made. A Citizens Advisory Committee, comprised of local individuals representing civic and conservation groups, key figures in rural and urban communities, members of the academic community, members of professional groups, a State Senator, and a State Representative, held a total of 12 meetings. All committee meetings were open to the public and pertinent information was distributed through the news media.

8.03 The following is a list of those who were furnished copies of the Draft Environmental Impact Statement but made no comments.

U.S. Department of Commerce
U.S. Department of Health, Education and Welfare
U.S. Department of Housing and Urban Development

National Weather Service
Upper Mississippi River Basin Commission, Minneapolis
Upper Mississippi River Conservation Committee
Upper Mississippi Waterway Association
Water Resources Council
Hon. Wendell Anderson, Governor, State of Minnesota
Bureau of Environmental Planning and Protection, St. Paul
Minnesota Department of Economic Development
Minnesota Department of Agriculture, Dairy and Food
Minnesota Water Resources Board
Minnesota Department of Health
Minnesota Legislative Library
Minnesota Environmental Quality Council
Minnesota Railroad and Warehouse Commission, St. Paul
Minnesota State Environmental Services Section
Minnesota State Planning Agency
Minnesota State Park Commission
Minnesota Water Resources Board
Fresh Water Biological Institute, University of Minnesota
State Archaeologist, Minnesota
Soil Conservation Service, District Conservationist,
Mr. Ronald G. Hersom
Norman County Auditor, Ada
Norman County Board of Commissioners
Ada Development Cooperation, Chairman
Citizen's Advisory Committee, Wild Rice River Basin,
Mr. Edward Harold
Audubon Society, North Midwest Region
Clear Air - Clear Water Unlimited, So. St. Paul
Division of Environmental Health Association, Minneapolis
Ducks Unlimited, Minneapolis
Environmental Library of Minnesota
Environmental Information Center, Inc., New York
Environmental Quality Council, St. Paul
Environmental Science Center, Golden Valley
Friends of the Earth, Twin Cities
Izaak Walton League, Minnesota Division
Minnesota Association of Conservation Education, Minneapolis
Minnesota Conservation Federation, Hopkins
Minnesota Environmental Control Citizens Association
Minnesota Environmental Education and Research Association, St. Paul
Minnesota Pheasants Unlimited, Minneapolis
Minnesota Public Interest Research Group
Montana Environmental Quality Council, Helena
Northern Environmental Council, Duluth
Public Service Commission, State of New York, Albany
Sierra Club, North Star Chapter
Soil Conservation Society of America
Tri-College University, Center for Environmental Studies
Dr. Dale O. Anderson, Water Resources Research Institute,
North Dakota State University.

Dr. Daniel E. Willard, Institute for Environmental Studies,
University of Wisconsin
Dr. Paul B. Kannowski, Institute for Ecological Studies,
North Dakota State University
Library, University of Minnesota
Library, Ada, Minnesota
Library, University of North Dakota, Grand Forks
Library, Concordia, Moorhead
Library, Moorhead State College, Moorhead
Library, North Dakota State University, Fargo

8.04 Letters of comment on the Draft Environmental Impact Statement were received from the following interested parties (The letters appear in appendix I.):

U.S. Environmental Protection Agency
Advisory Council on Historic Preservation
U.S. Department of the Interior
U.S. Department of Agriculture, Forest Service
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Transportation, Coast Guard
Federal Power Commission
Minnesota Department of Natural Resources
Minnesota Department of Highways
Minnesota Pollution Control Agency
Minnesota Historical Society
Wild Rice Watershed District
Metropolitan Council, St. Paul, Minnesota
Center for Environmental Studies, Bemidji State College

8.05 The following paragraphs outline the Corps' responses to comments received:

U.S. ENVIRONMENTAL PROTECTION AGENCY

Comment - We have classified our comments as Category LO-2. Specifically, this means that although we have no major objections to the project based upon information obtained during our March 19, 1974 field trip and information presented in the EIS, we believe additional information is required to fully assess the project's environmental impacts.

Response - Comment noted. See following responses.

Comment - Project Description. A discussion of other related projects and land use plans in the watershed which will affect or be affected by the proposed project should be included in the EIS. The interrelationships and general environmental impacts of these related projects should be noted.

Response - The South Branch and Felton Ditch watersheds contain 15,640 acres of managed wildlife habitat including wetlands in the Goose Prairie area of eastern Clay County, comprised of the Aspen State Wildlife Management Area and parts of the Goose Prairie State Wildlife Management Area, plus other Federally administered areas. Future acquisition of wetlands in the watershed is projected to occur in the escarpment and headwaters areas rather than in the glacial lake plain setting of the recommended project. The Felton Wildlife Management Area was mentioned in the text under plan 7, an upstream reservoir.

Of more project related importance are the U.S. Soil Conservation Service programs administered through local Soil and Water Conservation Districts. The programs include various land treatment measures, small impoundments being found economically infeasible. There is some indication that local interests may construct small impoundments at local expense.

Another Corps project in the Wild Rice basin would be the authorized Twin Valley dam and reservoir. This project is evaluated in a draft environmental statement expected to be circulated in July of 1974. The Twin Valley project would reduce peak flows along the mainstem Wild Rice River and would not significantly affect the South Branch and Felton Creek watersheds. However, reduction in flood stage along the mainstem Wild Rice River would allow some back up of water from high concurrent South Branch flows just above the South Branch confluence with the Wild Rice.

Comment - Assurance should be provided in the EIS that local sponsors will adequately maintain project drainage facilities in the future. Furthermore, we believe that local assurances should include a condition that all major drainage ditches (road or farm) will be buffered by a vegetative zone to reduce sediment filling of project ditches. Consideration should also be given to local retention basins for reduction of sediment loads to streams and to possible recovery and redistribution of topsoil from these retention basins.

Response - The recommendations will be investigated in Phase II of post-authorization studies, and if the measures prove to be feasible, assurances would be obtained at that time. Barring unforeseen occurrences, such as very heavy erosion on the watershed, dredging would not be needed for a considerable period of years.

Comment - Environmental Impact. The South Branch of the Wild Rice River is classified as Category 2B, Fisheries and Recreation, by the State Water Quality Standards (WQS). The quality of this designated class shall be such as to permit the propagation and maintenance of cool or warm water sport or commercial fishes and be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. The EIS should describe the effects that this project will have on applicable WQS and the measures that will be taken to minimize short-term water quality impacts and insure long-term compliance with applicable WQS.

Response - Judgments as to effects on the applicable WQS would require knowledge of the magnitudes of water quality impacts, and the necessary information is not available at this time. The kinds of effects are identified, but the magnitudes are not. As noted in the response to the Department of Interior comment on paragraphs 3.11-3.13, further studies will aim at reducing adverse impacts.

Comment - A Section 303(e) plan (PL 92-500) for the area included in this project has not been developed by the State as of yet. Since the development of this 303(e) plan should include an evaluation of all flood protection and water resources' projects in order to insure conformance with basin planning objectives, it is necessary that your office develop a close working relationship with the State regarding this and future Corps projects in the area so they can produce appropriate 303(e) plans.

Response - This will be done.

Comment - With the construction of this project, will there be a commitment to continue and possibly increase the development and agricultural uses of floodplain lands within the watershed?

Response - The arable lands in the project floodplain are mostly under cultivation except for pastures, farmsteads, windbreaks, odd corners, etc. While reduction in flood damages would be economically advantageous for agriculture, it is doubtful that the acreage devoted to agriculture would expand significantly because there is very little undeveloped land in the floodplain. However, the project and economic pressures may well cause more intensive agricultural use of the land with tilled land taking the place of pastures, odd corners, wooded areas, etc. It is for this reason that references to the effect of the "wildlife corridor" are qualified to read "...would increase the quality of terrestrial wildlife habitat immediately adjacent to the project."

The question of the project's effect on the upper watershed has been dealt

with in the first comment-response under Minnesota Department of Natural Resources.

Comment - The EIS should include a discussion of the project's implications upon Minnesota's Environmental Policy Act (Section 10, Subdivision 3) which basically states that it is the policy of the State to reduce flood damages through floodplain management, thus stressing the importance of nonstructural measures. A combination of nonstructural alternatives, particularly floodplain regulation with the proposed project would be desirable and should insure the project's long-term success.

Response - As noted in the discussion of flood insurance and floodplain regulation in the ALTERNATIVES section, these alternatives are partially in effect in the basin and will be fully in effect in the near future regardless of implementation of the recommended project. The project would be constructed because it is economically justifiable, and it would not preclude the nonstructural alternatives of floodplain management.

Comment - The EIS should describe the effect of the proposed project on the Clay County Game Refuge and other wildlife areas within the watershed.

Response - The refuges and wildlife areas are in the upper part of the watershed (upstream of the project) and would not be affected by the recommended project. An upstream reservoir would have affected such areas as described in plan 7 of the ALTERNATIVES.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

Comment - Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while you have discussed the historical, architectural and archeological aspects related to the undertaking, the Advisory Council needs additional information to adequately evaluate the effects on these cultural resources. Please furnish additional data indicating:

Compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971

1. Under Section 2(a) of the Executive Order, Federal agencies are required to locate, inventory and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2(a).

2. Until the inventory required by Section 2(a) is complete, Federal agencies are required by Section 2 (b) of the Order to submit proposals for the transfer, sale, demolition,

or substantial alteration of federally-owned properties eligible for inclusion in the National Register of the Council for review and comment. Federal agencies must continue to comply with Section 2(b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties that are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory.

The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section 2(b) (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370).

3. Under Section 1(3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

   The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

The council suggests that a copy of the comments of the Minnesota Historic Preservation Officer on the effects of this undertaking on cultural resources be included in the final environmental statement. The Minnesota Historic Preservation Officer is Dr. Russell W. Fridley, Director, Minnesota Historical Society, 690 Cedar Street, St. Paul, Minnesota 55101.

Response - A contract for the necessary investigation is being negotiated with an archeologist recommended by Dr. Eldon Johnson, Minnesota State Archeologist. The work is expected to be completed in early autumn.

The comments of the Minnesota Historic Preservation Officer are contained later in this section.

U.S. DEPARTMENT OF THE INTERIOR

Comment - Paragraph 1.10 - The net effect of this project on wildlife will depend to a large degree on the general type and arrangement of vegetation established in the corridor. Wildlife would be most benefited if the corridor were planted to woody shrubs and low-growing trees; however, subsequent sections in the draft (paragraph 5.43, page 69) allude to potential problems associated with the planting of trees and shrubs near the channels. Since so much of the habitat value of the proposed project will depend upon selection of vegetation types, the environmental statement should discuss fully any factors (engineering or otherwise) that would preclude the choice of specific kinds of plantings.

Response - It is agreed that plantings of trees and shrubs near the channel would enhance the general value of the corridor for wildlife habitat. As regards problems with snow accumulation in the channels, perusal of reports on the use of shelter belts for snow fences indicates that the results are quite variable depending upon the type of planting. Woody plantings near the channel could then either increase or lessen the accumulation of snow in the channel. Note that paragraph 2.24 of the draft statement indicated that the ditches drift in with snow anyway, and the District has photographs on file which illustrate this.

The conclusion to be reached is that there probably are no insolvable architectural or engineering problems associated with woody plantings and that proper design of the plantings could increase project efficiency. The problems essentially lie in choice of a planting design which at the same time is aesthetically pleasing, enhances wildlife habitat values, and is acceptable to local interests. Optimization of the planting scheme will be attempted during advanced studies.

Comment - Operation and Maintenance - Paragraph 1.11 - It is not clear how the biological integrity of the proposed wildlife corridor will be maintained. There is potential for the corridor to be subject to intrusion by being used as a roadway or a farm vehicle turnabout place. Will the habitat plantings be fenced or otherwise be afforded protection? Also, the final statement should clearly state whether or not the wildlife corridor will be available for public access.

Response - The complete project would be turned over to local interests for maintenance, although it would be periodically inspected by the Corps for proper function and maintenance. The mechanism is therefore available for habitat preservation. However, before habitat preservation and public access can be assured, an agreement which outlines the measures which will be taken must be drawn up with the local sponsor. The sponsor will be approached in this regard during further studies. No elements of the project would require operation.

Comment - Recreation - Paragraph 2.81--2.85 - We do not believe that general recreation potential or needs have been adequately discussed. Recreation can and should be an integral part of the project.

Such specific uses as trails and picnic areas should be related to the project, and the impacts of such development on the overall environmental setting should be discussed. The method(s) by which these developments can be accomplished also should be addressed.

Response - The project presently does not claim recreational benefits nor has a recreational plan been prepared. The possibility for recreational development will be investigated during further studies, and recreational development would be undertaken if justifiable and if a local sponsor could be found.

Comment - Paragraphs 3.11--3.13 - Among the expected changes in the streams mentioned, it should be noted that widening of the stream will cause the water to be more shallow and hence subject to greater thermal changes.

Response - Concur. Suggested addition has been made to the text. During further studies efforts will be made to reduce such impacts. Study aimed at solving the problem mentioned will include an analysis of the feasibility of a V-bottom channel or a smaller, low-flow channel within the larger one, the intent being to maintain a narrow deep channel. Other features which will be studied are small channel structures for the purpose of maintaining small pools in the channel.

Comment - Paragraphs 3.14--3.15 - This section should state that the wildlife corridor would be more valuable to wildlife if it is vegetated with woody plant species rather than grasses.

Response - Concur. Suggestion has been incorporated into the text.

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE

Comment - Natural resource agencies in Manitoba may be interested in this project. Flow and quality of water in the Red River will be affected by this and similar projects.

Response - The Canadians have not expressed an interest in this project although they have not been contacted regarding this specific part of the study of the Red River of the North basin. The reason is that the effects of this project on flow and water quality would be negligible by the time the water reaches Canada. However, the cumulative effects of all the proposed projects in the Red River of the North basin have not been evaluated. Although some projects such as this would degrade at least certain aspects of water quality, other projects would enhance it, such as by low-flow augmentation and dilution of irrigation return flows. The net effect has not been identified, nor can it be at this time since the effects of other projects in the basin are not yet predictable.

Comment - Environmental impact of the proposed project is well described along with alternate plans. We assume that Plan 9 (p.67) is the one to

be used, as stated on p. 74. It is not clear which of the vegetative treatments on Plate 2 will be used.

Response - Except for details on acreages and economics, plan 9 is identical to the proposed plan except that plan 9 would provide 10 percent flood protection and the proposed plan would provide 6 percent protection. The text has been clarified in this regard. The vegetative treatment has not been chosen, and as indicated in the response to the first U.S. Department of the Interior comment, the choice will be made in a later phase of study.

Comment - Relative abundance of aquatic fauna (Appendix F) is given but not that of trees and shrubs (Appendix A). Loss of "6.6 miles of relatively natural streambeds and banks" is mentioned (p. 46) with no further description of amount and type of woodland.

Response - The contract for environmental information about the project was not set up to generate the data in question.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICES

Comment - There are no apparent conflicts between this project and any Soil Conservation Service project or program in Minnesota.

Response - Comment noted.

U.S. DEPARTMENT OF TRANSPORTATION, COAST GUARD

Comment - The Department of Transportation has reviewed the material submitted. The Federal Highway Administration had the following comments:

"It is suggested that the final include additional information regarding the highways and bridges affected including location, type, and jurisdiction. The work indicated in the "Design Memorandum" relating to excavating under existing structures should receive review and approval of the responsible highway agency to assure that structural integrity is not compromised."

The Department of Transportation has no further comments nor do we have any objection to the project. The final statement, however, should address the concern of the Federal Highway Administration.

Response - Bridge locations and required work at each location, including channel bank protection where necessary, are shown on plates 6 and 7 in Design Memorandum No. 1, Phase I, General Plan Formulation and Hydrology. A copy of this report was furnished, with the draft environmental statement to the Federal Highway Administration and the Minnesota Commissioner of Highways. Data on costs for highway bridge alterations have been furnished by the Norman and Clay County engineers. Further coordination relating to detailed bridge design modifications will be accomplished during the General Design Memorandum, Phase II, Project Design phase of preconstruction planning.

FEDERAL POWER COMMISSION

Comment - Our principal concern with improvements affecting land and water resources is the possible effect of such improvements on the construction and operation of bulk electric power facilities, including potential hydroelectric developments, and a natural gas pipeline. Since there are no hydroelectric developments, nor potential developments in the basin or downstream of it, nor does the improvement affect any gas pipelines, we have no comments regarding this draft statement.

Response - Comment noted.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Comment - The project area is typically flat prairie country, presently in agricultural production. Since much of the natural habitat has been destroyed, the proposed channeling, levees and drop inlet structures would appear to have a limited adverse impact on the remaining natural habitat within the project area.

However, any additional work projects beyond the scope of the project proposed in the draft EIS would produce a considerable adverse impact. If an "adquate outlet" for the upper one-half of the Wild Rice River South Branch Watershed and the headwaters area of Felton Creek becomes a reality, adverse effects due to the loss or degradation of the remaining lakes, marshes, woodlands and brushlands in the upper area would be experienced. Hopefully the headwater areas of the river and ditch, including the uneven topography of the glacial Lake Agassiz beachlines, will remain relatively unchanged in the future.

Response - The question raised in the second paragraph is common to flood damage reduction projects. There appears to be some controversy in the watershed over this matter with some people in the headwaters wanting more drainage and the people downstream wanting less because they fear increased flooding. Although we are not aware of any studies dealing with this matter, it is our opinion that drainage is controlled by various economic, legal and social factors unrelated to the existence of downstream flood damage reduction works. That is, the social factors surrounding increased downstream flooding do not weigh heavily upon consideration of drainage, and drainage is considered whether or not there are downstream protective works. Earlier drafts of the project documents did claim a social benefit from allowance of increased upstream drainage, but these references were deleted.

The adverse environmental impacts of drainage are concurred with.

Comment - The proposed plans include development of a berm or spoil bank 30 feet wide on either side of the river and ditch. This is the area within which the draft EIS contemplates development of a wildlife corridor.

However, natural and wildlife habitat cannot be enhanced greatly unless the width of the corridor is increased. We recommend that consideration be given to reviewing this aspect of the proposal and that the Department of Natural Resources and the Bureau of Sport Fisheries and Wildlife be consulted concerning possible modifications.

Response - As indicated in the response to the first U.S. Department of the Interior comment, this matter will be reexamined in the next phase of study. The agencies mentioned will be consulted.

Comment - In the future, measures to mitigate or enhance the natural environment should be given early consideration in order that the recommendations of other concerned agencies can be incorporated into the overall project plans and budget. To better assure the planning of environmentally sound projects in the future, the Department of Natural Resources offers its assistance and cooperation.

Response - The Water Resources Council's Principles and Standards for Planning Water and Related Land Resources, and the Corps' application thereof, has environmental quality as a planning objective and requires environmental considerations to parallel other considerations. Our intent is to incorporate these concerns early in the planning process, and we are moving in this direction. Increased coordination and cooperation with other agencies is, justifiably, becoming an increasingly larger part of the program.

MINNESOTA DEPARTMENT OF HIGHWAYS

Comment - It appears that the proposed project will have little if any impact on trunk highway structures, therefore we have no specific comments.

Response - Comment noted.

MINNESOTA POLLUTION CONTROL AGENCY

Comment - The draft EIS does not present data for the South Branch Wild Rice River or Felton Ditch, but does present data from an MPCA monitoring station on the Wild Rice River itself near its confluence with the Red River of the North. It does emphasize that these data reflect only the condition of the main stem Wild Rice River and the data are very limited. The draft EIS postulates that quality of the Wild Rice River could be indicative of that in the South Branch and Felton Ditch, and if this were done one could postulate good water quality in the proposed project area. A glance at the data shows, however, that the number of samples is few and in some cases standards for 2B waters are exceeded. The draft EIS states that "before such a postulation would be valid, more data, collected at frequent intervals on the South Branch and Felton Ditch, would be required." The draft EIS does not contain any indication of plans to do so, however.

Response - It does not seem that more definitive water quality data would require a change in project formulation; thus there are no plans to gather additional data. An exception might be that good water quality would allow the Felton Creek trout fishery to exist further downstream. This possibility will be further investigated. The text of the statement concerning interpretations of water quality data has been modified.

Comment - In a phone conversation with Bob Kay of EPA, who attended the tour concerning the project on March 19, 1974, he states there are no buffer zones along the ditches and farmers plow right up to and sometimes into the ditches.

Response - The wildlife corridor could help restrict this practice along some reaches.

Comment - The draft EIS does not indicate whether any liquid or solid wastes will be deposited on land during the proposed project, other than the dredged spoils and does not indicate whether these spoils would be a source of contamination.

Response - Disposal needs are anticipated to only involve the dredged spoils, and no contaminants other then those usually associated with streams in this agricultural area are expected.

Comment - The draft EIS states that it expects the effects of the project on water quality to be temporary by increasing turbidity, sedimentation, temperature and decreases in dissolved oxygen. The draft EIS does not indicate what the expected magnitude or time duration of these changes would be, or expected effects on downstream main stem Wild Rice River, and does not give any information on pollutants which may be present in the sediments to be disturbed. The draft EIS does not state whether placing the spoils 20 feet from the channel would have any adverse effect on surface water quality.

Response - The text of the EIS has been amended to note that the project would have some long term effects on water quality. The magnitude of effects on water quality is unknown, and it is recognized that this would depend to some extent upon unpredictable factors such as streamflow and rainfall during time of construction. Although dredging would adversely affect water quality, the placement of spoil is not expected to have a significant effect on surface water quality.

Comment - Since the purpose of the project is to enhance removal of floodwaters, it is reasonable to expect that the proposed changes may have some effect on normal flows as well. The effect of any change in flow on water quality is not apparent in the EIS. Likewise the effect on water quality of the downstream main stem Wild Rice River due to any sudden surge in flow due to floods in the proposed project area is not discussed.

Response - The effect of the project in raising water temperatures during non-flood periods has been incorporated into the text.

Changes in water quality due to a difference in flow rate are not anticipated.

Comment - A drop inlet structure is proposed on Felton Ditch to prevent scouring and erosion which could occur in the transition from existing natural channel to the modified sections. Since a similar transition occurs in the South Branch, the EIS does not state why a drop inlet structure is not used in the South Branch as well.

Response - Hydraulic and soil conditions for the reach in question are such that a drop structure is not needed to prevent erosion.

Comment - The draft EIS states "the existing channel bottom would not be deepened more than 2 feet in any reach of the new ditch. This would preclude any major impact on groundwater from this feature." No supporting evidence is presented for this statement, however.

Response - The sentence in question (first sentence, paragraph 3.06) was misleading in the draft statement since it implied that there would be a general deepening of the channels. The hydraulic design for this project was based on the premise of maintaining existing channel invert grades. The sentence now states that: "The channel design is based on maintaining existing channel invert grades, and there would be no general deepening of the channel."

Comment - The draft EIS states that technical and financial assistance will be given to landowners in applying soil and water conservation practices so as to minimize water and wind-blown sediments entering the channel system.

Response - The statement in question is found in paragraph 15 of Flood Control, Wild Rice River-South Branch and Felton Ditch, Minnesota. Design Memorandum No. 1, Phase I. General-Plan Formulation and Hydrology. U.S. Army Engineer District, St. Paul, Minnesota 55101. May, 1974. The draft report was circulated at the same time as the draft environmental statement. The assistance is the responsibility of the Soil Conservation Service and the Agricultural Stabilization and Conservation Service. Any acceleration of the program would involve Congress and the Department of Agriculture.

Comment - Since the project consists mainly of channel enlargement and work along the river such as removal and/or replacement of bridges and side-ditch inlet construction and modification, it appears that no permits such as NPDES or disposal system permits would be needed. Certifications normally associated with this type of work, such as dredging certification, would be needed.

Response - This matter will be examined during further studies.

MINNESOTA HISTORICAL SOCIETY

Comment - The DEIS and Design Memorandum have been reviewed by the Survey and Planning and Archaeology Sections of the Minnesota Historical Society as you requested in a letter dated 3 April 1974. It is the finding of this review that, in recognition of information supplied by the University of Minnesota

Department of Archaeology, there will be no apparent effect upon known or recorded properties of archaeological or historical significance as a result of the implementation of the project. It is also apparent that the area is in need of an archaeological survey prior to the commencement of work, to insure that there are no sites which have been previously unrecognized which may be directly affected by the project. It is suggested that provisions for such survey be included in the final plans for this project.

Response - Comment noted. See also the response to the comments of the Advisory Council on Historic Preservation.

WILD RICE WATERSHED DISTRICT

Comment - The project would better serve its intended purpose if the following modifications to the South Branch project were adopted:

1. At the mouth of the South Branch to Mile 1.4, the only work anticipated is debris removal. The Board feels that channel improvements should be considered as well as the providing of diking where necessary at this area to protect farmsteads and other low lying areas in this region.

2. From Mile 15 to Mile 16 (approximate), it is the opinion of the Board that any new construction would set the stage for future erosion due to the relative steep gradients of the area as well as the erosive nature of the soils in this area.

Response -

1. Debris removal only was recommended for the lower 1.4 miles since it would lessen environmental impacts while the original channel surveys indicated that the natural channel capacity in this reach would satisfy design criteria. However, the original survey data will be updated so that this matter may be examined.

2. Further studies will provide for sufficient soil borings and testing to allow examination of this matter and proper design as regards erosion.

Comment - From an engineering viewpoint, it is recommended that final ditch grades be chosen which will not produce channel erosion. If drop structures are necessary to achieve permissible velocities, then these structures should be utilized. Laboratory analyses should be made of existing soils at various intervals along the proposed channels to insure that erosive velocities are not exceeded. It is also recommended that channel inslopes be incorporated that will be stable both at high and low water conditions.

Response - The project design will be such that erosion would be controlled. As noted above, further soil borings and testing will be accomplished.

METROPOLITAN COUNCIL, ST. PAUL, MINNESOTA

Comment - The Council will not review the proposal since it lies outside the Council's geographical jurisdiction.

Response - Comment noted.

CENTER FOR ENVIRONMENTAL STUDIES, BEMIDJI STATE COLLEGE

Comment - It would have been particularly valuable if copies of the E.A. Hibbard (1973) study of this project had been distributed to those whose views on the Impact Statement are now solicited. Our comments are made without having seen the Hibbard Study.

Response - The value of the reader's having ready access to background information is recognized. Although we do not believe that the general distribution of supporting materials is justified we are beginning to file background environmental reports in accessible places in the project area.

Comment - Reference is made to protection from a "6-percent frequency flood", (Par. 1.01) describing the project recommended by the Corps of Engineers, and to a 10% - frequency in describing several of the alternates. Since we are also aware of projects which are planned for other frequencies (e.g. a 1% - frequency flood), we think it appropriate for the Environmental Impact Statement to indicate the legal, economic or other basis for selecting the flood frequency criteria appropriate to any given project.

Response - Felton Ditch and South Branch channel design capacities providing protection from floods with estimated 20, 10, 6, and 5 percent frequencies of occurence were used in an economic optimization analysis. The annual benefits and costs were based upon a 50-year economic life and a 3 1/4 percent interest rate. The chosen 6-percent level of protection produces net economic returns in such a way that the amount by which benefits exceed costs is at a maximum. In addition to having a maximum excess of benefits, a project (as well as any separable segment or increment selected to accomplish a given purpose) should be more economical than any other actual or potential available means, public or private, of accomplishing flood damage reduction. These are the basic principles used to formulate a plan which fulfills the national economic development planning objective, provided that there are no significant adverse environmental quality effects left unmitigated.

The floodplain evacuation alternative was evaluated for the area flooded by a 4 percent flood.

The flood insurance alternative was evaluated on the basis of the 4 percent flood. Since floodplain regulation is required for participation in the flood insurance program, that alternative is usually evaluated in terms of the

1 percent flood.

Projects in rural areas are usually economically optimal at a low degree of protection although the criterion for non-structural alternatives is usually the 1 percent flood.

In urban areas consideration of the hazard of failure causes the Corps to consider the standard project flood as the degree of protection that should be sought in the design of protective works. The standard project flood is defined as the flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area of the drainage basin, excluding extremely rare combinations. None of the alternatives considered would approach standard project flood protection.

Comment - Estimation of benefit: cost ratios (Par. 3.20 and 3.21) does not appear to include the amortization of the original cost over the 50-year expected life of the project, or the cost of debt-servicing the unamortized portion (which at current interest rates may be quite high). These are very real items to the taxpayer. I believe that while inclusion of such items would increase costs, the benefit: cost ratios of the project and of its principal alternatives would still be greater than 1.

Response - The cost has been amortized over the 50-year economic life of the project, and paragraph 3.20 has been clarified by specifying that the cited benefits and costs are average annual benefits and costs.

Average annual benefits and costs are based on an interest rate of 3 1/4 percent and price levels and conditions prevailing in April 1973. The economic life would depend upon the type of project considered and would be 100 years for reservoirs and permanent floodplain evacuation, and 50 years for channelization, rural levee systems and other nonstructural measures. Water Resources Council regulations established in 1969 allow application of the 3 1/4 percent interest rate on all authorized projects where "satisfactory assurance to pay the required non-Federal share of the project costs" was received from project sponsors by December 1969. Such assurance was received from the Wild Rice Watershed District in a letter dated 22 October 1969.

Comment - The allegation (Par. 3.22) that "a system of man-made ditches is undoubtedly aesthetically preferable to a portion of the population while others would consider the lack of natural waterways a blight to the landscape" appears to negate the responsibility to weigh aesthetic factors within the spirit and intent of the National Environmental Policy Act of 1969 which states (Sect. 101.b.(4) that we are to "preserve ... natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity...."

Response - The reason for portraying two contrasting viewpoints on aesthetic matters is that "Beauty is in the eye of the beholder."

Section 101 (b)(2) of the Act ("assure for all Americans...esthetically... pleasing surroundings") is taken into account during structural design and landscaping, and attractive existing features would be retained when possible. Due to individual differences in tastes, aesthetic factors do not usually weigh heavily on plan selection except for drastically differing alternatives.

Comment - The prospects (Par. 1.10 and 3.15) of a wildlife corridor plan to be developed in "Phase II postauthorization studies in cooperation with the U.S. Bureau of Sport Fisheries and Wildlife and Minnesota Department of Natural Resources", while commendable in purpose, appears to be less than adequate either for assessment of original costs or of environmental impact at the pre-authorization stage. The concept embodied in Plate 2 (referred to in Par. 1.10) suggests, in its most elaborate form two single rows of trees with accompanying low shrubs on either side of a ditch. It may be that biologically viable wildlife corridors suitable for small mammals and providing food cover and nesting sites of a variety of birdlife might require wooded strips several hundred feet in width. A preliminary study to establish what species could be accommodated by a wildlife corridor, and what their requirements may be, might cost less than 1% of the anticipated cost of the project. It would however reveal whether the wildlife corridor would be expensive enough to alter significantly project cost calculations, or whether it would, in the interests of minimizing costs, be kept to the dimensions of a shelterbelt of little environmental value to wildlife.

Response - As noted earlier, this matter will be reexamined during further studies. It has been District policy to adequately mitigate adverse environmental impacts even if the cost affects the benefit to cost ratio, assuming that the ratio remains above unity.

Comment - Much of the environmental loss in the project recommended by the Corps relates to the loss of natural stream habitat on the South Branch Wild Rice River below mile 8.1 and above mile 16.7. Alternative Plan 11 (Par. 5.49 - 5.52) would save this habitat and cost $200,000 less initially. To retain such environmental values flood control is reduced from 74.8% to 61%. No indication is given of the cost of modification of this alternative to provide the 74.8% level of protection. It would appear that, in an area in which natural stream habitat is now relatively rare, the indicated cost for saving this several miles of a natural water course is not unreasonable.

On the basis of the limited information presently available to us, we would favor Alternative 11 over the project presently recommended by the Corps.

Response - The difference in damage reduction is due to a difference in project sizing; plan 11 and the recommended plan both provide 61 percent reduction in flood damages at a 10 percent level of protection (See Appendix H.) Comparing the plans at the 10 percent level indicates that plan 11 is less favorable economically (higher first costs, both Federal and non-Federal, with resultant lower net benefits and a lower benefit to cost ratio) while it would require more bridge modifications, 45 more acres of cropland, 14 more acres of farmsteads, roads, highways, railroads, existing drainage ditch, or other such lands. On the other hand, plan 11 would require 14 fewer acres of pasture or hay meadow, 2 fewer acres of natural upland habitat, and 3.4 fewer miles of a stream (both previously channelized and unchannelized) alteration. Plan II would

therefore be a candidate for the environmental quality plan required to be formulated by the Water Resources Council's Principles for Planning Water and Related Land Resources. However, the Council's Standards allow for selective application to authorized but unfunded projects, and the Corps is taking the position that complete reformulation is not required.

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APPENDIX A

COMMON AND SCIENTIFIC NAMES OF WOODY PLANTS FOUND IN THE WILD RICE RIVER WATERSHED

APPENDIX A

Common and Scientific Names of Woody Plants Found in the Wild Rice River Watershed. (From: Hibbard, 1973).

TREES AND SHRUBS

Common Names	Scientific Names
American elm	Ulmus americana
Arrow-wood	Viburnum refinesquianum
Balsam fir	Abies balsamea
Balsam poplar	Populus balsamifera
Basswood	Tilia americana
Bebb willow	Salix bebbiana
Bittersweet, climbing	Celastrus scandens
Black ash	Fraxinus nigra
Blackberry	Rubus sp.
Black cherry	Prunus serotina
Black haw	Viburnum lentago
Blx elder	Acer negundo
Buckbrush (wolfberry)	Symphoricarpos occidentalis
Bur oak	Quercus macrocarpa
Chokecherry	Prunus virginiana
Cottonwood	Populus deltoides
Currant (gooseberry)	Ribes americanum
Currant (gooseberry)	Ribes cynosbati
Currant (gooseberry)	Ribes missouriense
Dogwood	Cornus alternifolia
Dogwood	Cornus racemosa
Dwarf blackberry	Rubus pubescens
False indigo	Amospha fruticosa
Green ash	Fraxinus pennsylvanica var. lanceolata
Hackberry	Celtis occidentalis
Hawthorn	Crataegus sp.
Hazel, beaked	Corylus cornuta
Hazel	Corylus americana
High-bush cranberry	Vibernum opulus var. americanum
Honeysuckle	Lonicera dioica
Ironwood	Ostrya virginiana
Jack Pine	Pinus banksiana
Juneberry	Amelanchier sp.
Paperbirch	Betula papyrifera
Peach-leaved willow	Salix amygdaloides
Pinchberry	Prunus pennsylvanica
Prickly ash	Zanthoxylum americanum
Poison ivy	Rhus radicans
Rasberry	Rubus strigosus
Red Maple	Acer rubrum
Red-osier dogwood	Cornus stolonifera

Common Name	Scientific Name
Red pine	*Pinus resinosa*
Rose	*Rosa blanda*
Silverberry	*Eleagnus argentea*
Silver maple	*Acer saccharinum*
Snow-berry	*Symphoricarpos alba*
Sugar maple	*Acer saccharum*
Tamarack	*Larix laricin*
Trembling aspen	*Populus tremuloides*
Virginia creeper	*Parthenocissus vitacea*
White pine	*Pinus strobus*
White spruce	*Picea glauca*
Wild grape	*Vitis riparia*
Wild plum	*Prunus americana*

APPENDIX B

COMMON AND SCIENTIFIC NAMES OF MAMMALS FOUND IN THE WILD RICE WATERSHED AREA

APPENDIX B

Common and Scientific Names of Mammals found in the Wild Rice Watershed area. (From: Hibbard, 1973).

Common Names	Status	Scientific Names
Masked shrew	2	Sorex cinereus
Arctic shrew	1	Sorex arcticus
Short-tailed shrew	2	Blarina brevicauda
Little brown bat	2	Myotis lucifugus
Eastern cottontail	2	Sylvilagus floridanus
White-tailed jack rabbit	1	Lepus townsendii
Snowshoe hare	1R	Lepus americanus
Eastern chipmunk	2	Tamias striatus
Woodchuck	1	Marmota monax
Richardson's ground squirrel	1R	Spermophilus richardsonii
Thirteen-lined ground squirrel	2	Spermophilus tridecemlineatu
Gray squirrel	1	Sciurus carolinensis
Fox squirrel	1R	Sciurus niger
Red squirrel	3	Tamiasciurus hudsonicus
Plains pocket gopher	2	Geomys bursarius
Beaver	2	Castor canadensis
Prairie deer mouse	3	Peromyscus maniculatus bairc
Woodland deer mouse	4	Peromyscus maniculatus graci
White-footed mouse	3	Peromyscus leucopus
Northern grasshopper mouse	1R	Onychomys leucogaster
Boreal red-backed mouse	3	Clethrionomys gapperi
Meadow vole	3	Microtus pennsylvanicus
Muskrat	1	Ondatra zibethica
Norway rat	1?	Rattus norvegicus
House Mouse	2	Mus musculus
Meadow jumping mouse	2	Zapus hudsonicus
Coyote	1	Canis latrans
Red fox	2	Vulpes vulpes
Gray fox	1R	Urocyon cinereoargenteus
Black bear	1R	Ursus americanus
Raccoon	2	Procyon lotor
Ermine	2	Mustela erminea
Long-tailed weasel	1	Mustela frenata
Least weasel	1R	Mustela nivalis
Mink	2	Mustela vision
Badger	1	Taxidea taxus
Striped skunk	2	Mephitis mephitis
White-tailed deer	2	Odocoileus virginiana
Moose	1R	Alces alces

SYMBOLS: 1 - uncommon, 2 - common, 3 - very common,
4 - not found in Norman County, 1R - rare.

APPENDIX C

COMMON AND SCIENTIFIC NAMES OF BIRD SPECIES FOUND ALONG THE FLOODPLAIN FORESTS OF THE WILD RICE RIVER

APPENDIX C

Common and Scientific Names of Bird Species found along the Floodplain Forests of the Wild Rice River (Includes only those more common and/or unusual bird species present.) (From: Hibbard, 1973).

Common Names	Status	Scientific Names
Great Blue Heron	1	Ardea herodias
Mallard	1	Anas platyrhynchos
Wood Duck	2	Aix sponsa
Goshawk	1(MO)	Accipiter gentilis
Cooper's Hawk	2	Accipiter cooperli
Red-tailed Hawk	2	Buteo jamaicensis
Broad-winged Hawk	2	Buteo platypteras
Marsh Hawk	1	Circus cyaneus
Sparrow Hawk	2	Falco sparverius
Ruffed Grouse	2	Bonasa umbellus
Greater Prairie Chicken	1	Tympanuchus cupido
Ring-necked Pheasant	1R	Phasianun colchicus
Gray Partridge	1	Perdix perdix
Sandhill Crane	MO	Grus canadensis
Killdeer	2	Charadrius vociferus
American Woodcock	1R	Philohela minor
Upland Plover	1	Bartramia longicauda
Spotted Sandpiper	2	Actitis macularia
Marbled Godwit	1	Limosa fedoa
Mourning Dove	2	Zenaidura macroura
Great Horned Owl	2	Bubo virginianus
Barred Owl	2	Strix varia
Belted Kingfisher	2	Megaceryle alcyon
Pileated Woodpecker	1	Hylatomus pileatus
Hairy Woodpecker	2	Dendrocopos villosus
Great Crested Flycatcher	2	Myiarchus crinitus
Eastern Phoebe	1	Sayornis phoebe
Least Flycatcher	2	Empidonax minimus
Bank Swallow	3	Riparia riparia
Blue Jay	2	Cyanocitta cristata
Black-billed Magpie	1R	Pica pica
White-breasted Nuthatch	2	Sitta carolinensis
House Wren	2	Troglodytes aedon
Veery	2	Hylocichla fuscenscens
Sprague's Pipit	1R	Anthus spragueii
Yellow-throated Vireo	1	Vireo flavifrons
Red-eyed Vireo	3	Vireo olivaceus
Warbling Vireo	2	Vireo gilvus
Yellow Warbler	2	Dendroica petechia
Oven bird	2	Seiurus aurocapillus
American Redstart	3	Setophaga ruticilla
Western Meadowlark	1	Sturnella neglecta
Redwinged Blackbird	2	Agelaius phoeniceus

Common Names	Status	Scientific Names
Baltimore Oriole	2	*Icterus galbula*
Rose-breasted Grosbeak	2	*Pheucticus ludovicianus*
Baird's Sparrow	1R	*Ammodramus bairdii*
Common Crow	2	*Corvus brachyrhynchos*
Black-capped Chickadee	3	*Parus atricapillus*

SYMBOLS: 1 - uncommon, 2 - common, 3 - very common, 1R - rare,
MO - migrant only.

APPENDIX D

COMMON AND SCIENTIFIC NAMES OF AMPHIBIANS AND REPTILES FOUND IN THE WILD RICE WATERSHED

APPENDIX D

Common and Scientific Names of Amphibians and Reptiles Found in the Wild Rice Watershed (From: Hibbard, 1973).

Common Names	Status	Scientific Names
Tiger salamander	2	Ambystoma tigrinum
American toad	2	Bufo americanus
Plains toad	2	Bufo cognatus
Manitoba toad	2	Bufo hemiophrys
Chorus frog	3	Pseudacris nigrita
Common tree frog	1	Hyla versicolor
Leopard frog	2	Rana pipiens
Wood frog	3	Rana sylvatica
Snapping turtle	1	Chelydra serpentina
Painted turtle	1	Chrysemys picta
Prairie skink	2	Eumeces septentrionalis
Western hog-nosed snake	1	Heterodon nasicus
Red-bellied snake	2	Storeria occipitomaculata
Plains garter snake	2	Thamnophis radix
Common garter snake	2	Thamnophis sirtalis
Smooth green snake	1	Opheodrys vernalis

SYMBOLS: 1 - uncommon, 2 - common, 3 - very common.

APPENDIX E

CHECKLIST OF THE FISHES SEINED OR OBSERVED IN FELTON DITCH AND THE SOUTH BRANCH OF THE WILD RICE RIVER

APPENDIX E

Checklist of the fishes seined or observed in Felton Ditch and the South Branch of the Wild Rice River. (From: Hibbard, 1973).

Species	Felton Ditch	SBWR
Esox lucius (northern pike)	2	2
Catostomus commersoni (white sucker)	1	3
Moxostoma macrolepidotum (northern redhorse)	-	2
Chrosomus phoxinus (northern redbelly dace)	-	1
Hybopsis biguttata (horny head chub)	-	3
Notropis cornutus (common shiner)	2	3
Notropis stramineus (sand shiner)	-	2
Notropis dorsalis (rosyface shiner)	-	3
Pimephales promelas (fathead minnow)	1	2
Rhinichtys atratulus (blacknose dace)	-	3
Rhinichthys cataractae (longnose dace)	2	1
Semotilus atromaculatus (creek chub)	3	3
Semotilus margarita (pearl dace)	2	-

SYMBOLS: 1 - uncommon, 2 - common, 3 - very common.

APPENDIX F

OCCURRENCE AND RELATIVE ABUNDANCE AQUATIC FAUNA (EXCLUDING FISHES) FROM THE FELTON DITCH AND SOUTH BRANCH OF THE WILD RICE RIVER

APPENDIX F

OCCURRENCE AND RELATIVE ABUNDANCE*
AQUATIC FAUNA (EXCLUDING FISHES) FROM THE FELTON DITCH
AND SOUTH BRANCH OF THE WILD RICE RIVER
(FROM: HIBBARD, 1973)

Phylum and species	Felton	SBWR
Annelida		
Placobdella rugosa	-	1
Arthopoda		
Orconectes virilis (crayfish)	3	3
Acroneuria lycorias (stonefly)	2	-
Hydropsyche bifida (caddis fly)	2	2
H. slossonae (caddis fly)	3	2
Baetis vagaws (mayflies)	-	1
Ephemera simulans (mayflies)	2	1
Hexagenia limbata (mayflies)	2	-
Stenonema vicarium (mayflies)	2	-
Isonychia sp. (mayflies)	1	-
Tetragonuria canis (dragon fly)	1	1
Optioservus fastiditus (beetle)	2	2
Optioservus sp. (beetle larvae)	2	2
Chironomus sp. (midges)	3	3
Atherix sp. (snipeflies)	2	-
Tipula sp. (craneflies)		
Molluska		
Sphaerium spp. (fingernail clams)	2	2
Pisidium spp. (fingernail clams)	-	1
Anodonta grandis (fresh water)	-	1
A. ferussacianus (fresh water)	-	1
Lampsilis siliquoidea (fresh water)	-	2
Ferrissia sp. (limpet)	-	1
Amnicola spp. (limpet)	1	2
Armiger spp. (limpet)	-	-
Heliosoma campanulata (limpet)	-	2
Physa sp. (limpet)		2

* 1 - uncommon, 2 - common, 3 - very common.

APPENDIX G

WATER QUALITY DATA, WILD RICE RIVER, MINNESOTA

APPENDIX G

WATER QUALITY MONITORING DATA, WILD RICE RIVER, MINNESOTA[a] (FROM: HIBBARD, 1973)

Item	Unit	8-25-71	9-22-71	11-9-71	4-26-72	5-10-72
Time Collected		1700	1530	1530	1600	1530
Temperature	Degrees Fahrenheit	74	57	33	51	60
Coliform						
group (confirmed M.P.N. per 100 ml.)		5,400	13,000	16,000	4,900	390
organisms (fecal M.P.N. per 100 ml.)		3,500	1,400	20*	20	110
Fecal Streptococci			10			
Total Solids			250			
Total Volatile Matter			64			
Suspended Solids		35	12	52	290	150
Suspended Volatile Matter			3			
Turbidity		19	3	24	92	50
Color			40			
Total hardness as $CaCO_3$		250	300	320	260	280
Alkalinity as $CaCO_3$		240	250	220	210	230
pH		7.5	7.8	8.4	7.3	7.3
Chloride		5	5	9	5	4
Dissolved Oxygen		7.7	9.4	12.5	10.4	9.8
Five-day Biochemical Oxygen Demand		2.9	1.2	3.6	1.4	1.2
Total Phosphorus		0.08	0.11	.36	.38	.32
Ammonia Nitrogen		0.07	0.08	.18	.07	.06
Organic Nitrogen			0.85			
Nitrite Nitrogen			0.02			
Nitrate Nitrogen		0.1	0.05*	.3	.48	.06
Methylene Blue Active Sub. as ABS		0.45	.1*	.25	.1	.1*
Spec. Cond. uohms/cm @ 25° C.		480	510	560	420	470
Copper	u/l	13	10*	10*	10*	10*
Cadmium	u/l	10*	10*	10*	10*	10*
Nickel	u/l	10*	10*	10*	14	10*
Zinc	u/l	25	15	13	28	12
Lead	u/l	22	10*	10*	38	10*
Manganese	u/l		48	75	170	32

WATER QUALITY MONITORING DATA, WILD RICE RIVER, MINNESOTA[a] (FROM: HIBBARD, 1973) (Continued)

Item	Unit	8-25-71	9-22-71	11-9-71	4-26-72	5-10-72
Iron	u/l		790	2,000	6,700	370
Pesticide	u/l		.01*		.01*	.01*
Mercury	u/l	2.1	.05	.05*	.05*	1.0
Arsenic	u/l	40	10*	10*	10*	10*
Selenium	u/l	10*	10*	10*	10*	10*
Calcium		130	100	160	130	130
Flouride		0.1	0.1	0.1	0.1	0.1
Sodium		13	11	11	8	9
Potassium		7	7		8	4
PCB's	u/l				.05*	.05*
Gross Alpha	pCi/L		3*			
Gross Beta	pCi/L		13 + 3			
Total Chromium	u/l		10-*			
Hexavalent Chromium	u/l		10*			
Cyanide	u/l		5*			
Phenol	u/l		5*			
Boron	u/l		70			
Magnesium as $CaCO_3$			200			
Sulfate			38			
Silver	u/l		.002*			
Barium			.02*			
Sulfide			.05*			
Oil and Grease			.3*			

* less than value indicated

a Data collected by Minnesota Pollution Control Agency at U.S. Highway #75, Hendrum, Minnesota.

APPENDIX H

ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF THE SELECTED PLAN FOR VARIOUS SCALES OF DEVELOPMENT

APPENDIX H

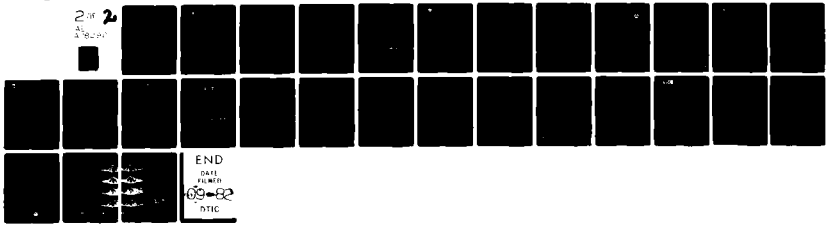
ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF THE SELECTED PLAN FOR VARIOUS SCALES OF DEVELOPM

[illegible]	[illegible]-Percent Design Frequency	[illegible]-Percent Design Frequency	[illegible]-Percent Design Frequency	[illegible]-Percent Design Frequency
I. [illegible]				
A. [illegible] First Cost ($[illegible])	[illegible]	[illegible]	2.6	3.2
B. Federal First Cost ($Million)	1.2	1.7	2.3	2.8
C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D. [illegible] ($1,000)	8	[illegible]	[illegible]	[illegible]
E. [illegible]	61	[illegible]	[illegible]	[illegible]
F. Average [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. Net average annual [illegible]	163	[illegible]	[illegible]	[illegible]
H. [illegible] average annual damages [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
I. Benefit-cost ratio	3.59	[illegible]	[illegible]	[illegible]
II. [illegible]				
A. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C. Acres [illegible]	96,[illegible]	96,[illegible]	[illegible]	[illegible]
D. Acres [illegible]	NONE	NONE	NONE	NONE
E. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
F. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. Relocation [illegible]	[illegible]		[illegible]	
H. [illegible] roads severed	[illegible]			
I. Number of [illegible] sites adversely affected (5)	[illegible]			
J. Improvement of public health	MODERATE	MAJOR	MAJOR	MAJOR
K. Aesthetic impact	MODERATE	MODERATE	MODERATE	MODERATE
L. Effect on downstream flood problems	SLIGHT DECREASE	SLIGHT DECREASE	SLIGHT DECREASE	SLIGHT DECREASE
M. Reduction in snow accumulation in channel	YES	[illegible]	[illegible]	[illegible]
III. [illegible]				
A. [illegible] gained (± acres)				
1. [illegible]	[illegible]	[illegible]		
2. [illegible]	[illegible]	[illegible]	[illegible]	
3. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B. [illegible] gained (± acres)				
1. [illegible]	[illegible]		[illegible]	
2. [illegible]			[illegible]	
C. [illegible] gained (± acres)				
D. [illegible] channelized streams affected				
1. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. [illegible] water surface area	[illegible]	[illegible]	[illegible]	[illegible]
3. [illegible] channel [illegible] area	[illegible]	[illegible]	[illegible]	[illegible]
E. [illegible] streams affected				
1. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. [illegible] water surface area	[illegible]	[illegible]	[illegible]	[illegible]
3. [illegible] channel area	[illegible]	[illegible]	[illegible]	[illegible]
F. [illegible] affected				
1. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. [illegible] water area	[illegible]			
3. [illegible] channel area	[illegible]	[illegible]	[illegible]	[illegible]
G. [illegible] water	TEMPORARY REDUCTION	TEMPORARY REDUCTION	TEMPORARY REDUCTION	TEMPORARY REDUCTION
H. [illegible]	NONE	[illegible]	[illegible]	[illegible]
I. Rare or endangered [illegible] species affected	NONE	[illegible]	[illegible]	
J. Rare or unique vegetation areas affected	NONE	[illegible]	[illegible]	
K. [illegible] wilderness areas affected	NONE	[illegible]	[illegible]	[illegible]
L. Number of [illegible] affected	NONE KNOWN	NONE KNOWN	[illegible]	[illegible]

(1) [illegible] area redevelopment benefits.
(2) Degree [illegible] expressed as a percentage [illegible]
(3) [illegible] area and farm business [illegible] affected.
(4) [illegible] intermediate regions [illegible] area.

AD-A118 292 CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT F/G 13/2
FLOOD CONTROL WILD RICE RIVER - SOUTH BRANCH AND FELTON DITCH, --ETC(U)
SEP 74

UNCLASSIFIED NL



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APPENDIX I

LETTERS OF COMMENT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
1 NORTH WACKER DRIVE
CHICAGO, ILLINOIS 60606

Colonel Rodney E. Cox
District Engineer
U. S. Army Engineer District, St. Paul
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

We have completed our review of the Draft Environmental Impact Statement (EIS) for Local Flood Protection Works, South Branch Wild Rice River and Felton Ditch in Norman and Clay Counties, Minnesota, as requested in your letter of April 3, 1974. We have classified our comments as Category LO-2. Specifically, this means that although we have no major objections to the project based upon information obtained during our March 19, 1974 field trip and information presented in the EIS, we believe additional information is required to fully assess the project's environmental impacts.

The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act. We offer the following comments:

Project Description

A discussion of other related projects and land use plans in the watershed which will affect or be affected by the proposed project should be included in the EIS. The interrelationships and general environmental impacts of these related projects should be noted.

Assurance should be provided in the EIS that local sponsors will adequately maintain project drainage facilities in the future. Furthermore, we believe that local assurances should include a condition that all major drainage ditches (road or farm) will be buffered by a vegetative zone to reduce sediment filling of project ditches. Consideration should also be given to local retention basins for reduction of sediment loads to streams and to possible recovery and redistribution of topsoil from these retention basins.

Environmental Impact

The South Branch of the Wild Rice River is classified as Category 2B, Fisheries and Recreation, by the State Water Quality Standards (WQS). The quality of this designated class shall be such as to permit the propagation and maintenance of cool or warm water

sport or commercial fishes and be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. The EIS should describe the effects that this project will have on applicable WQS and the measures that will be taken to minimize short-term water quality impacts and insure long-term compliance with applicable WQS.

A Section 303(e) plan (PL 92-500) for the area included in this project has not been developed by the State as of yet. Since the development of this 303(e) plan should include an evaluation of all flood protection and water resources projects in order to insure conformance with basin planning objectives, it is necessary that your office develop a close working relationship with the State regarding this and future Corps projects in the area so they can produce appropriate 303(e) plans.

With the construction of this project, will there be a commitment to continue and possibly increase the development and agricultural uses of floodplain lands within the watershed? The EIS should include a discussion of the project's implications upon Minnesota's Environmental Policy Act (Section 10, Subdivision 3) which basically states that it is the policy of the State to reduce flood damages through floodplain management, thus stressing the importance of nonstructural measures. A combination of nonstructural alternatives, particularly floodplain regulation with the proposed project would be desirable and should insure the project's long-term success.

The EIS should describe the effect of the proposed project on the Clay County Game Refuge and other wildlife areas within the watershed.

We appreciate the opportunity to review this Draft EIS and the courtesy extended to my staff on their field trip. Please send us two copies of the Final EIS when it is filed with the Council on Environmental Quality.

Sincerely yours,

Donald A. Wallgren
Chief, Federal Activities Branch

Advisory Council
On Historic Preservation
1522 K Street N.W. Suite 430
Washington D.C. 20005

May 15, 1974

Col. Rodney E. Cox
District Engineer
St. Paul District
Corps of Engineers
U.S. Department of the Army
1210 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

This is in response to your request of April 3, 1974, for comments on the environmental statement for the proposed Local Flood Protection Works, South Branch Wild Rice River and Felton Ditch, Norman and Clay Counties, Minnesota. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while you have discussed the historical, architectural and archeological aspects related to the undertaking, the Advisory Council needs additional information to adequately evaluate the effects on these cultural resources. Please furnish additional data indicating:

Compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971

1. Under Section 2(a) of the Executive Order, Federal agencies are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2(a).

2. Until the inventory required by Section 2(a) is complete, Federal agencies are required by Section 2(b) of the Order to submit proposals for the transfer, sale, demolition, or substantial alteration of federally-owned properties eligible for inclusion in the National Register of the Council for review and comment. Federal agencies must continue to comply with Section 2(b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties that are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory.

The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section 2(b) (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370).

3. Under Section 1(3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

   The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

The Council suggests that a copy of the comments of the Minnesota Historic Preservation Officer on the effects of this undertaking on cultural resources be included in the final environmental statement. The Minnesota Historic Preservation Officer is Dr. Russell W. Fridley, Director, Minnesota Historical Society, 690 Cedar Street, St. Paul, Minnesota 55101.

Should you have any questions or require any additional assistance, please contact Jordan Tannenbaum 202-254-3974 of the Advisory Council staff.

Sincerely yours,

Ann Webster Smith
Director, Office of Compliance

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
536 SOUTH CLARK STREET
CHICAGO, ILLINOIS 60605

(ER-74/479)

May 22, 1974

Col. Rodney E. Cox
District Engineer
U. S. Army Engineer District
St. Paul
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Col. Cox:

This is in response to your April 3, 1974, letter requesting Department of the Interior comments on the draft environmental statement and Design Memorandum No. 1, Phase I, for Flood Control, Wild Rice River--South Branch and Felton Ditch, Clay and Norman Counties, Minnesota. Our comments follow:

DRAFT ENVIRONMENTAL IMPACT STATEMENT

1. PROJECT DESCRIPTION

WILDLIFE CORRIDOR

1.10 The net effect of this project on wildlife will depend to a large degree on the general type and arrangement of vegetation established in the corridor. Wildlife would be most benefited if the corridor was planted to woody shrubs and low-growing trees; however, subsequent sections in the draft (paragraph 5.43, page 69) allude to potential problems associated with the planting of trees and shrubs near the channels. Since so much of the habitat value of the proposed project will depend upon selection of vegetation types, the environmental statement should discuss fully any factors (engineering or otherwise) that would preclude the choice of specific kinds of plantings.

OPERATION AND MAINTENANCE

1.11 It is not clear how the biological integrity of the proposed wildlife corridor will be maintained. There is potential for the corridor to be subject to intrusion by being used as a roadway or a farm vehicle turnabout place. Will the habitat plantings be fenced or otherwise be afforded protection? Also, the final statement should clearly state whether or not the wildlife corridor will be available for public access.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT

RECREATION

2.81--2.85 We do not believe that general recreation potential or needs have been adequately discussed. Recreation can and should be an integral part of the project. Such specific uses as trails and picnic areas should be related to the project, and the impacts of such development on the overall environmental setting should be discussed. The method(s) by which these developments can be accomplished also should be addressed.

3. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

STREAM RESOURCES

3.11--3.13 Among the expected changes in the streams mentioned, it should be noted that widening of the stream will cause the water to be more shallow and hence subject to greater thermal changes.

ANIMAL RESOURCES

3.14--3.15 This section should state that the wildlife corridor would be more valuable to wildlife if it is vegetated with woody plant species rather than with grasses.

DESIGN MEMORANDUM NO. 1, PHASE I

Phase I of the project planning has been coordinated with concerned agencies within the Department of the Interior; and reflects various inputs to the postauthorization studies which were received from these agencies. However, we offer the following additional comments for inclusion into the final Phase I Design Memorandum.

23. RECREATION NEEDS AND DEVELOPMENT OBJECTIVES

Page 10 shows the recreational needs of the general area as listed in the 1968 Minnesota Outdoor Recreation Plan. It also states that there is little opportunity to meet these needs with the project. In this respect we do not believe that this project is in accordance with the 1968 plan, as it appears that such activities as picnicking, hunting, and horse-back riding could be an integral part of this project and should be given full consideration to help meet the recreation needs of the area.

107. ENVIRONMENTAL AND AESTHETIC CONSIDERATIONS

The revegetation of the side slopes and berms should be done for the purpose of obtaining a varied and natural setting as possible. Planting should not be installed in row fashion. Staggering some of the planting beyond the landward side of the berm would be desirable in not only widening the strip in places but giving the overall project a more natural look. The use of trees should be encouraged to the greatest extent possible and riprap should be natural field stone, if available.

116. WILDLIFE CORRIDOR

Our major concern relates to the establishment of the wildlife corridor adjacent to the proposed channels. Page 41 (paragraph 118, OPERATION AND MAINTENANCE), states that cultivation would be allowed on the landward slopes of the spoil bank. We suggest that this same landward slope be planted with shrubs to establish habitat of value to wildlife. Such plantings set back from the channel bank may minimize the accumulation of windblown snow in the channels.

118. OPERATION AND MAINTENANCE

Another area of concern to us is the future use and maintenance of the wildlife corridor. Without proper protective measures, the corridor may conceivably become a "wildlife corridor" in name only. Specific measures must be taken to insure the biological integrity of the corridor. Fencing is one measure which should be considered.

Sincerely,

for Madonna F. McGrath
Staff Assistant to
the Secretary

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER DARBY, PA. 19082
TELEPHONE (215) 597-3772

8400
May 10, 1974

Colonel Rodney E. Cox,
District Engineer, Corps of Engineers
St. Paul District
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Re: NCSED-PB

Dear Col. Cox:

We have reviewed your Draft Environmental Impact Statement for Flood Control, Wild Rice River, South Branch and Felton Ditch, Minnesota. This was forwarded to us with your cover letter by our regional office because no National forest land was involved.

Natural resource agencies in Manitoba may be interested in this project. Flow and quality of water in the Red River will be affected by this and similar projects.

Environmental impact of the proposed project is well described along with alternate plans. We assume that Plan 9 (p. 67) is the one to be used, as stated on p. 74. It is not clear which of the vegetative treatments on Plate 2 will be used.

Relative abundance of aquatic fauna (Appendix F) is given but not that of trees and shrubs (Appendix A). Loss of "6.6 miles of relatively natural streambeds and banks" is mentioned (p. 46) with no further description of amount and type of woodland.

We appreciate the opportunity to review and comment on this draft.

Sincerely,

ROBERT D. RAISCH
Director

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
316 North Robert Street, St. Paul, Minnesota 55101

July 9, 1974

Major Norman C. Hintz, Acting District Engineer
St. Paul District, Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Major Hintz:

Re: NCSED-PB

As requested, we have reviewed the Draft Environmental Impact Statement for Flood Control Wild Rice River-South Branch and Felton Ditch, Minnesota.

It was our pleasure to contribute to the preparation of this document through a discussion of the present land treatment status and drainage needs. My representative also attended the coordination tour and meeting March 19, 1974.

There are no apparent conflicts between this project and any Soil Conservation Service project or program in Minnesota.

Sincerely,

Harry M. Major
State Conservationist

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

22 MAY 1974

Colonel Rodney E. Cox
Department of the Army
St. Paul District, Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

This is in response to your letter of 3 April 1974 addressed to Mr. Carlson, St. Paul District Federal Highway Administration Division Engineer concerning the draft environmental impact statement for Flood Control, Wild Rice River - South Branch and Felton Ditch, Minnesota.

The Department of Transportation has reviewed the material submitted. The Federal Highway Administration had the following comments:

"It is suggested that the final include additional information regarding the highways and bridges affected including location, type, and jurisdiction. The work indicated in the "Design Memorandum" relating to excavating under existing structures should receive review and approval of the responsible highway agency to assure that structural integrity is not compromised."

The Department of Transportation has no further comments nor do we have any objection to the project. The final statement, however, should address the concern of the Federal Highway Administration.

The opportunity to review this draft statement is appreciated.

Sincerely,

R. I. PRICE
Captain, U. S. Coast Guard
Acting Chief, Office of Marine
Environment and Systems

FEDERAL POWER COMMISSION
REGIONAL OFFICE
United States Custom House
610 South Canal Street - Room 1051
Chicago, Illinois 60607

April 29, 1974

Colonel Rodney E. Cox
District Engineer, St. Paul
Department of the Army
Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

We have reviewed the Draft Environmental Impact Statement for "Flood Control, Wild Rice River - South Branch and Felton Ditch, Minnesota", furnished with your letter of April 3, 1974.

Our principal concern with improvements affecting land and water resources is the possible effect of such improvements on the construction and operation of bulk electric power facilities, including potential hydroelectric developments, and a natural gas pipeline. Since there are no hydroelectric developments, nor potential developments in the basin or downstream of it, nor does the improvement affect any gas pipelines, we have no comments regarding this draft statement.

Thank you for the opportunity to comment on this Draft Environmental Statement. We will appreciate receipt of similar statements prepared for future projects.

Very truly yours,

Lenard B. Young
Regional Engineer

By [signature]
(Acting)

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

May 29, 1974

Col. Rodney E. Cox
District Engineer
Department of the Army
St. Paul District, Corps of Engineers
1210 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Re: Draft Environmental Impact Statement for the South Branch Wild Rice River - Felton Ditch Project

Dear Colonel Cox:

The Department of Natural Resources has reviewed the draft Environmental Impact Statement for the South Branch Wild Rice River - Felton Ditch proposed project and submits the following comments and recommendations:

The project area is typically flat prairie country, presently in agricultural production. Since much of the natural habitat has been destroyed, the proposed channeling, levees and drop inlet structures would appear to have a limited adverse impact on the remaining natural habitat within the project area.

However, any additional work projects beyond the scope of the project proposed in the draft EIS would produce a considerable adverse impact. If an "adequate outlet" for the upper one-half of the Wild Rice River South Branch Watershed and the headwaters area of Felton Creek becomes a reality, adverse effects due to the loss or degradation of the remaining lakes, marshes, woodlands and brushlands in the upper area would be experienced. Hopefully the headwater areas of the river and ditch, including the uneven topography of the glacial Lake Agassiz beachlines, will remain relatively unchanged in the future.

The proposed plans include development of a berm or spoil bank 30 feet wide on either side of the river and ditch. This is the area within which the draft EIS contemplates development of a wildlife corridor. However, natural and wildlife habitat cannot be enhanced greatly unless the width of the corridor is increased. We recommend that consideration be given to reviewing this aspect of the proposal and that the Department of Natural Resources and the Bureau of Sport Fisheries and Wildlife be consulted concerning possible modifications.

In the future, measures to mitigate or enhance the natural environment should be given early consideration in order that the recommendations of other concerned agencies can be incorporated into the

overall project plans and budget. To better assure the planning of environmentally sound projects in the future, the Department of Natural Resources offers its assistance and cooperation.

Sincerely,

Jerome H. Kuehn
Planning Administrator

JHK:VH:rd

cc: Archie D. Chelseth
Merlyn Wesloh
Division Directors
PERT Members

STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS
ST. PAUL, MINN. 55155

April 30, 1974

Colonel Rodney E. Cox
Corps of Engineers
District Engineer
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

In reply refer to: 330
Wild Rice River-South Branch
and Felton Ditch Flood Control

Your Ref: NCSED-PB

Dear Colonel Cox:

We have reviewed the draft Environmental Statement and supplemental information transmitted with your April 3, 1974 letter. It appears that the proposed project will have little if any impact on trunk highway structures, therefore we have no specific comments.

Thank you for sending the draft statement and other data for our review.

Sincerely,

Ray Lappegaard
Commissioner

MINNESOTA POLLUTION CONTROL AGENCY
1935 W. County [illegible] Roseville, Minnesota 55113

612-296-7202

May 16, 1974

Mr. Rodney E. Cox
Colonel, Corps of Engineers
District Engineer
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Mr. Cox

In compliance with your letter to us of April 8, 1974, please find enclosed our draft comments on the environmental impact statement for flood control, Wild Rice River-South Branch and Felton Ditch, Minnesota. Please give this matter your deepest attention and I would appreciate discussing this with you at your convenience.

Very truly yours,

Lewis C. Barbe

LEWIS C. BARBE, DIRECTOR
DIVISION OF WATER QUALITY

LCB:mf

cc: Mr. Francis T. Mayo, Regional Administrator, U.S. Environmental Protection Agency,

DEPARTMENT Pollution Control Agency

STATE OF MINNESOTA

Office Memorandum

TO : L. [illegible] C. Harte, Director
Division of Water Quality

DATE: May 6, 1971

FROM : Perry T. Eaton, Chief
Section of Municipal Wastes
Division of Water Quality

SUBJECT: Review of Draft of Environmental Impact Statement - Flood Control Wild Rice River - South Branch and Felton Ditch

As requested, we have completed our review of the subject draft Environmental Impact Statement and have the following comments:

1. Project Description

The project proposes to reduce flooding by means of channel enlargement, levee construction, side ditch inlet modification, and lateral ditch inlet modifications as follows: a) 33.1 miles of waterway will be affected, of which 20.1 miles will be subject to excavation of both banks, 10.0 miles will be excavated along one bank only, and 3.0 miles will be subject to debris removal only. The material excavated would be spoiled on adjacent crop land with the toe of the spoil bank 20 feet from the top of the channel bank. The slope of spoil banks would be 1 on 3 on the riverward side and 1 on 4 on the land ward side. An additional 2.8 miles of waterway would be inclosed with [illegible] ditch. b) Four bridges would be removed and/or replaced. c) 108 side-lateral inlets would be altered and/or constructed. d) Existing lateral ditches would be plugged and replaced with 36-inch culverts, flap gates, and headwall outfalls. A drop inlet structure is proposed on the Felton Ditch to prevent scouring and erosion which could occur in the transition from existing natural channel to the modified sections.

2. Effect on Water Quality

In order to assess the impact of the project on surface and groundwater quality the following factors should be taken into account:

a) Present surface and groundwater quality

b) Steps taken to prevent surface and groundwater degradation during and after the project.

c) Expected surface and groundwater quality after the project is completed, during both normal flows and flood conditions.

The draft EIS addresses itself to the above factors in the following ways:

A. Present surface and groundwater quality

1. Surface water quality. The draft EIS does not have a source of data for the South Branch Wild Rice River or Felton Ditch, but does

present data from an MPCA monitoring station on the Wild Rice River itself near its confluence with the Red River of the North. It does emphasize that these data reflect only the condition of the main stem Wild Rice River and the data are very limited. The draft EIS postulates that quality of the Wild Rice River could be indicative of that in the South Branch and Felton Ditch, and if this were done one could postulate good water quality in the proposed project area. A glance at the data shows, however, that the number of samples is few and in some cases standards for 2B waters are exceeded (incidentally the data reported in chart for copper, cadmium, nickel, zinc, lead, manganese, iron, pesticide, mercury, arsenic, selenium, PCB's, total chromium, hexavalent chromium, cyanide, phenol, boron, and magnesium as $CaCO_3$ should be ug/l, not mg/l as stated). The draft EIS states that "before such a postulation would be valid, more data, collected at frequent intervals on the South Branch and Felton Ditch, would be required." The draft EIS does not contain any indication of plans to do so, however.

The draft EIS lists 8 communities which discharge to the Wild Rice or its tributaries, and states that other sources of pollution are commercial establishments and agricultural runoff. In a phone conversation with Bod Kay of EPA, who attended the tour concerning the project on March 19, 1974, he states there are no buffer strips along the ditches and farmers plow right up to and sometimes into the ditches.

2. Groundwater quality. The design memorandum states "normal low flows . . . are inadequate for development as dependable water supply sources. All municipal, domestic and farm water supplies are obtained from groundwater . . ." Dissolved solids of groundwater in the recharge area contain 300-500 mg/l and 500-1,000 mg/l in the discharge area, and all of the water is hard (200 - 300 mg/l). The draft EIS states that the silts and soft clays present in the area make the possibility of contamination of groundwater a consideration in locating disposal sites for liquid or solid wastes. The draft EIS does not indicate whether any liquid or solid wastes will be deposited on land during the proposed project, other than the dredged spoils and does not indicate whether these spoils would be a source of contamination.

B. Steps taken to prevent water degradation and expected effect on water quality

The design memorandum states that "the least destructive construction techniques would be used, including such practices as seasonal construction; limiting excavation to one bank in specified areas; using temporary sediment basins and other devices, where appropriate, to limit sedimentation and other pollution during construction; and prompt vegetation of spoil, channels, and other disturbed areas. Plant materials would be selected for their ability to control erosion, provide food and cover for wildlife and for their beauty and ease of maintenance. After project completion and when vegetation has been reestablished within the channels, on spoil banks, and in leveed areas, no appreciable change from preproject conditions is expected in water quality parameters."

The draft EIS states that it expects the effects of the project on water quality to be temporary by increasing turbidity, sedimentation, temperature and decreases in dissolved oxygen. The draft EIS does not indicate what the expected magnitude or time duration of these changes would be, or expected effects on downstream main stem Wild Rice River, and does not give any information on pollutants which may be present in the sediments to be disturbed. The draft EIS does not state whether placing the spoils 20 feet from the channel would have any adverse effect on surface water quality.

Since the purpose of the project is to enhance removal of floodwaters, it is reasonable to expect that the proposed changes may have some effect on normal flows as well. The effect of any change in flow on water quality is not apparent in the EIS. Likewise the effect on water quality of the downstream main stem Wild Rice River due to any sudden surge in flow due to floods in the proposed project area is not discussed.

A drop inlet structure is proposed on Felton Ditch to prevent scouring and erosion which could occur in the transition from existing natural channel to the modified sections. Since a similar transition occurs in the South Branch, the EIS does not state why a drop inlet structure is not used in the South Branch as well.

The draft EIS states "the existing channel bottom would not be deepened more than 2 feet in any reach of the new ditch. This would preclude any major impact on groundwater from this feature." No supporting evidence is presented for this statement, however.

The draft EIS states that technical and financial assistance will be given to landowners in applying soil and water conservation practices so as to minimize water and wind-blown sediments entering the channel system.

3. Permits or Certifications needed

Since the project consists mainly of channel enlargement and work along the river such as removal and/or replacement of bridges and side-ditch inlet construction and modification, it appears that no permits such as NPDES or disposal system permits would be needed. Certifications normally associated with this type of work, such as dredging certification would be needed.

MINNESOTA HISTORICAL SOCIETY

Fort Snelling Branch (Building 27) Fort Snelling St. Paul Minnesota 55111 • 612 726 1171

22 April 1974

Colonel Rodney E. Cox, District Engineer
Saint Paul District, Corps of Engineers
1210 U.S. Post Office and Custom House
Saint Paul, Minnesota 55101

Dear Colonel Cox:

RE: DEIS for Flood Control
Wild Rice River-South Branch
and Felton Ditch, Minnesota
and
Design Memorandum No. 1, Phase I
General-Plant Formulation and Hydrology
January 1974

The DEIS and Desing Memorandum above has been reviewed by the Survey and Planning and Archaeology Sections of the Minnesota Historical Society as per your request of 3 April 1974. It is the finding of this review that, in recognition of information supplied by the University of Minnesota Department of Archaeology, there will be no apparent effect upon known or recorded properties of archaeological or historical significance as a result of the implementation of the above listed project. It is also apparent that the area is in need of an archaeological survey prior to the commencement of work, to insure that there are no sites which have been previously unrecognized which may be directly affected by the project. It is suggested that provisions for such survey be included in the final plans for this project.

If you should have further questions or comments on this matter, please refer them to Mr. Alan R. Woolworth, Chief Archaeologist, Minnesota Historical Society, Building 27, Fort Snelling, Saint Paul, Minnesota 55111.

Respectfully,

Charles W. Nelson, Supervisor
Historic Sites Survey & Planning

cc: Russell W. Fridley, Director
Minnesota Historical Society

Alan Woolworth, Chief Archaeologist
Minnesota Historical Society

CWN/fr

Stanley C. Olson
Attorney for the District
406 East Main Street
Ada, Minnesota 56510
Phone 218-784-2821

WILD RICE WATERSHED DISTRICT

406 East Main Street
ADA, MINNESOTA 56510

May 18, 1974

Colonel Rodney E. Cox
Department of the Army
St. Paul District, Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

RE: WILD RICE-SOUTH BRANCH AND FELTON DITCH

Dear Colonel Cox:

The Board of Managers of the Wild Rice Watershed District has authorized me to make the following comments on their behalf relative to the Environmental Impact Statement for Flood Control, Wild Rice River-South Branch and Felton Ditch, Minnesota. After conferring with a number of local residents and with our Engineer, it is the opinion of our Board of Managers that the project would better serve its intended purpose if the following modifications to the South Branch project were adopted:

1. At the mouth of the South Branch to Mile 1.4, the only work anticipated is debris removal. The Board feels that channel improvements should be considered as well as the providing of diking where necessary at this area to protect farmsteads and other low lying areas in this region.

2. From Mile 15 to Mile 16 (approximate), it is the opinion of the Board that any new construction would set the stage for future erosion due to the relative steep gradients of the area as well as the erosive nature of the soils in this area.

From an engineering viewpoint, it is recommended that final ditch grades be chosen which will not produce channel erosion. If drop structures are necessary to achieve permissible velocities, then these structures should be utilized. Laboratory analyses should be made of existing soils at various

intervals along the proposed channels to insure that erosive velocities are not exceeded. It is also recommended that channel inslopes be incorporated that will be stable both at high and low water conditions.

The above are the major concerns of the Watershed District Board relative to the above project.

Very truly yours,

Stanley C. Olson
Attorney for the Wild Rice Watershed District

SCO:ml

Metropolitan Council
OF THE TWIN CITIES AREA

300 Metro Square Building, 7th Street and Robert Street, Saint Paul, Minnesota 55101 Area 612, 227-9421

April 9, 1974

Colonel Rodney Cox, District Chief
St. Paul District, Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Sir:

Thank you very much for sending us a copy of the draft Environmental Impact Statement for flood control, Wild Rice River - South Branch and Felton Ditch, Minnesota.

The jurisdiction of the Metropolitan Council, defined in the Metropolitan Council Act of 1967 and subsequent amendments, is limited to the counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington. Since the location of the proposed project, for which you sent us a copy of the draft Environmental Impact Statement, does not fall within one of the seven metropolitan counties we will not review this project.

We appreciate your concern to keep us informed.

Yours sincerely,

Marcel Jouseau
Program Manager, Natural Resources

MJ:lm

BSC BEMIDJI STATE COLLEGE BEMIDJI, MINNESOTA 56601

BIOLOGY - CENTER FOR ENVIRONMENTAL STUDIES - CHEMISTRY - COMPUTER SCIENCE - GEOLOGY - MATHEMATICS - PHYSICS
DIVISION OF SCIENCE & MATHEMATICS
218-755-2920

May 7, 1974

District Engineer
St. Paul District
Corps of Engineers,
1210 U.S. Post Office and Custom House
St. Paul, Mn. 55101

Dear Sir,

Your reference: NCSED-PB (Letter of 3 April 1974)

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for Flood Control, Wild Rice River-South Branch and Felton Ditch, Minnesota.

Since our staff has not independently examined the area of the Flood Control project, our comments are largely based on the information contained in the Draft Statement. It would have been particularly valuable if copies of the E.A. Hibbard (1973) study of this project had been distributed to those whose views on the Impact Statement are now solicited. Our comments are made without having seen the Hibbard study.

1. Reference is made to protection from a "6-percent frequency flood", (Par. 1.01) describing the project recommended by the Corps of engineers, and to a 10% - frequency in describing several of the alternates. Since we are also aware of projects which are planned for other frequencies (e.g. a 1% - frequency flood), we think it appropriate for the Environmental Impact Statement to indicate the legal, economic or other basis for selecting the flood frequency criteria appropriate to any given project.
2. Estimation of benefit:cost ratios (Par. 3.20 and 3.21) does not appear to include the amortization of the original cost over the 50-year expected life of the project, or the cost of debt-servicing the unamortized portion (which at current interest rates may be quite high). These are very real items to the taxpayer. I believe that while inclusion of such items would increase costs, the benefit:cost ratios of the project and of its principal alternatives would still be greater than 1.
3. The allegation (Par. 3.22) that "a system of man-made ditches is undoubtedly aesthetically preferable to a portion of the population while others would consider the lack of natural waterways a blight to the landscape " appears to negate the responsibility to weigh aesthetic factors within the spirit and intent of the National Environmental Policy Act of 1969 which states (Sect. 101. b.(4))

that we are to "preserve ... natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity...."

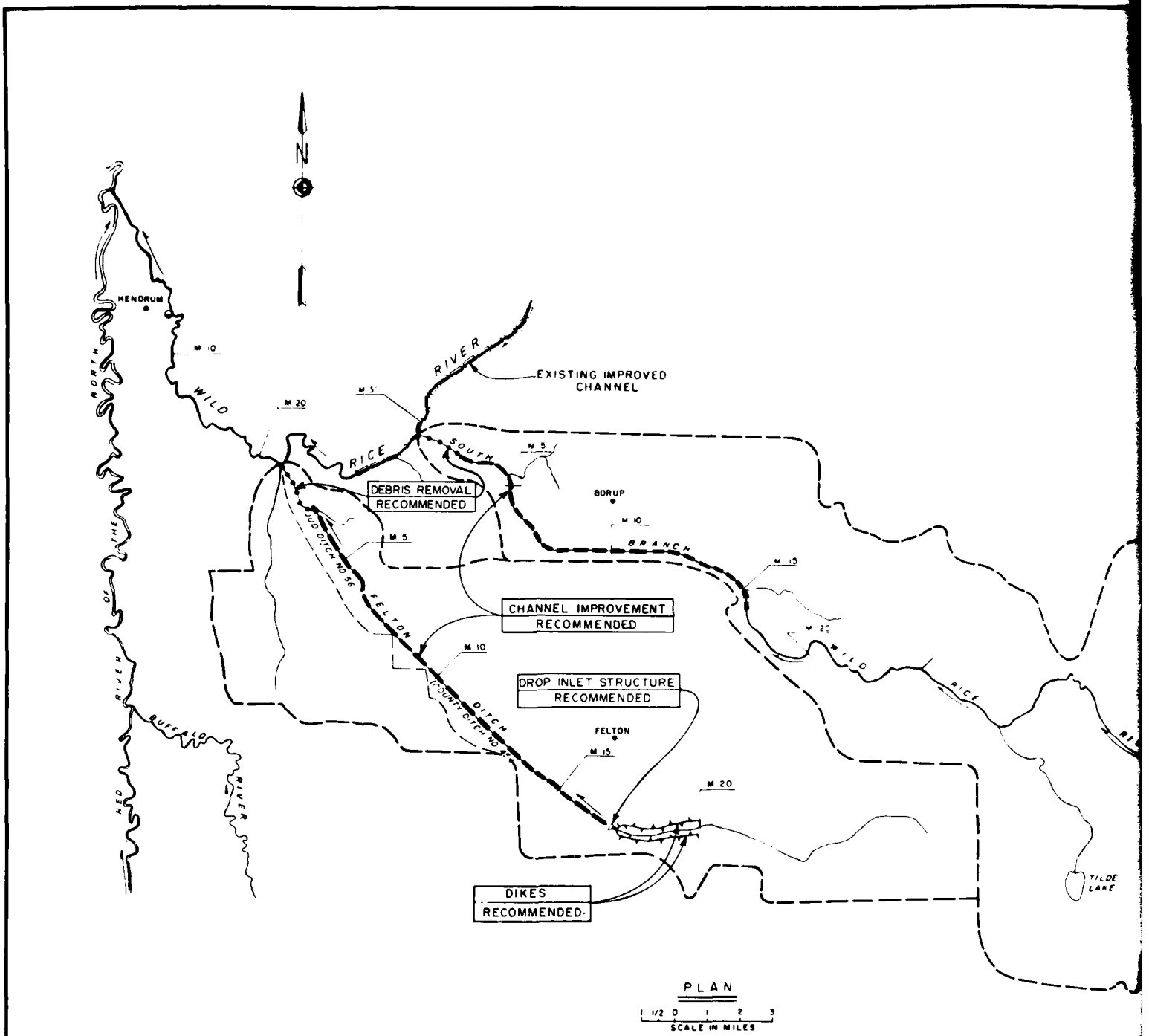
4. The prospects (Par. 1.10 and 3.15) of a wildlife corridor plan to be developed in "Phase II postauthorization studies in cooperation with the U.S. Bureau of Sport Fisheries and Wildlife and Minnesota Department of Natural Resources", while commendable in purpose, appears to be less than adequate either for assessment of original costs or of environmental impact at the pre-authorization stage. The concept embodied in Plate 2 (referred to in Par. 1.10) suggests, in its most elaborate form two single rows of trees with accompanying low shrubs on either side of a ditch. It may be that biologically viable wildlife corridors suitable for small mammals and providing food cover and nesting sites of a variety of birdlife might require wooded strips several hundred feet in width. A preliminary study to establish what species could be accommodated by a wildlife corridor, and what their requirements may be, might cost less than 1% of the anticipated cost of the project. It would however reveal whether the wildlife corridor would be expensive enough to alter significantly project cost calculations, or whether it would, in the interests of minimizing costs, be kept to the dimensions of a shelterbelt of little environmental value to wildlife.
5. Much of the environmental loss in the project recommended by the Corps relates to the loss of natural stream habitate on the South Branch Wild Rice River below mile 8.1 and above mile 16.7. Alternative Plan 11 (Par. 5.49 - 5.52) would save this habitat and cost $200,000 less initially. To retain such environmental values flood control is reduced from 74.8% to 61%. No indication is given of the cost of modification of this alternative to provide the 74.8% level of protection. It would appear that, in an area in which natural stream habitat is now relatively rare, the indicated cost for saving this several miles of a natural water course is not unreasonable.

On the basis of the limited information presently available to us, we would favor Alternative 11 over the project presently recommended by the Corps.

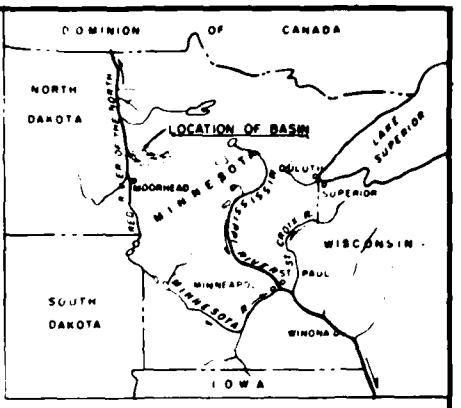
Yours truly,

Charles H. Fuchsman, Director
Center for Environmental Studies

CF:la

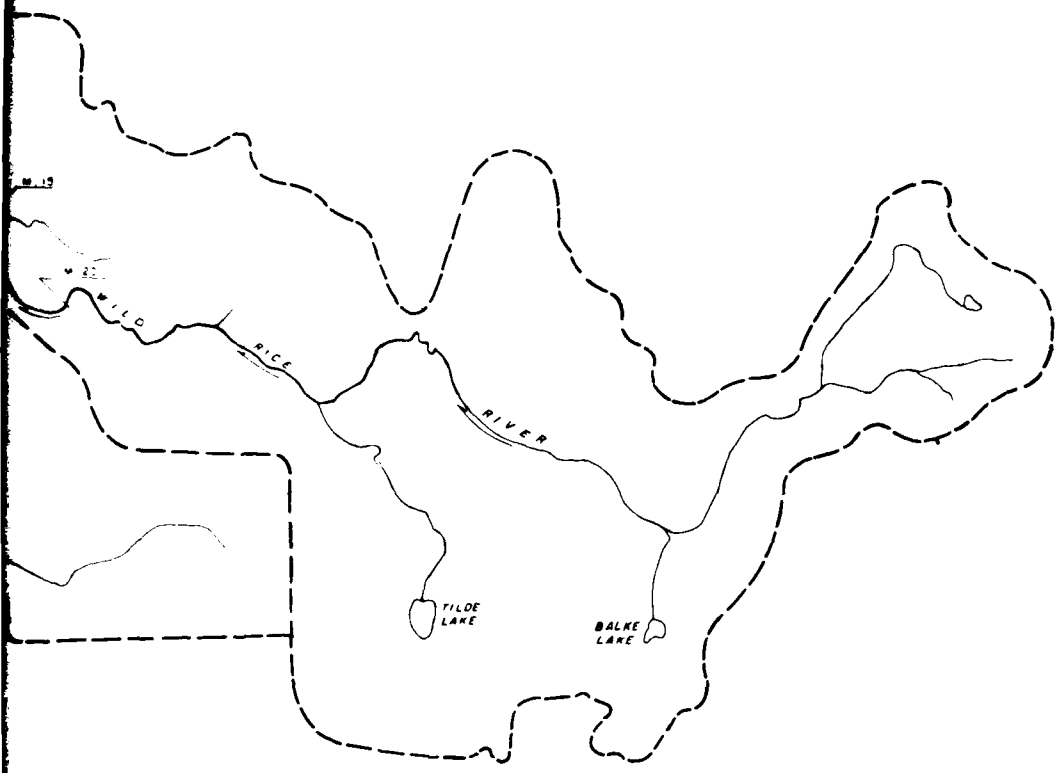

N
HENDRUM
M 10
NORTH
WILD
RICE
RIVER
M 20
M 5
EXISTING IMPROVED
CHANNEL
SOUTH
BRANCH
M 5
BORUP
M 10
DEBRIS REMOVAL
RECOMMENDED
M 5
MUD DITCH NO 56
FELTON
M 15
CHANNEL IMPROVEMENT
RECOMMENDED
M 10
DROP INLET STRUCTURE
RECOMMENDED
COUNTY DITCH NO 2
DITCH
FELTON
M 15
M 20
WILD
RICE
RIVER
BUFFALO
RED
RIVER
DIKES
RECOMMENDED
TILDE
LAKE
PLAN
1 1/2 0 1 2 3
SCALE IN MILES

U. S. ARMY



LOCATION MAP

50 0 50 100 150
SCALE IN MILES



SAFETY PAYS

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

DESIGN MEMORANDUM NO. 1 GENERAL-PHASE I PLAN FORMULATION

FLOOD CONTROL
WILD RICE RIVER - SOUTH BRANCH
AND FELTON DITCH, MINNESOTA
RECOMMENDED IMPROVEMENTS
GENERAL PLAN

SUBMITTED BY:

APPROVED: DATE:

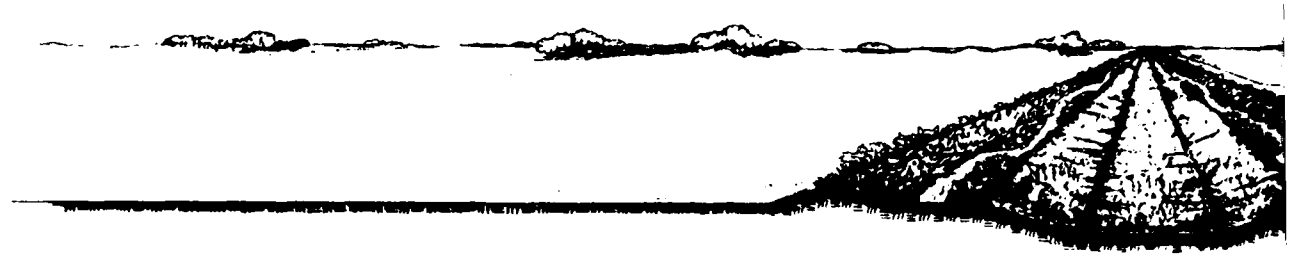
DRAWING NUMBER

SHEET OF

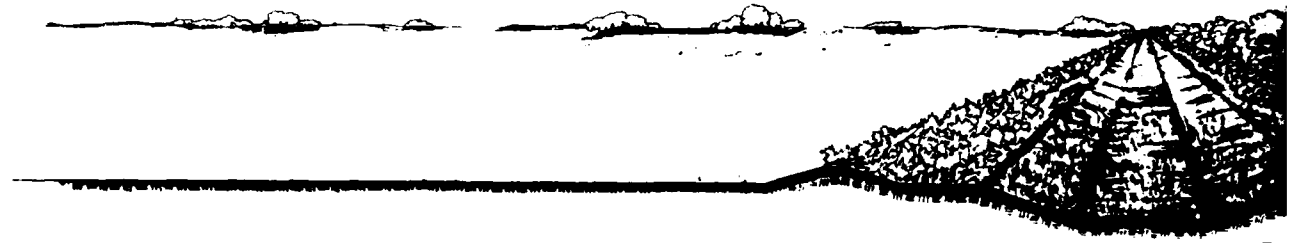
PLATE 1

CORPS OF ENGINEERS

ALTERNATIVE 1.



ALTERNATIVE 2.

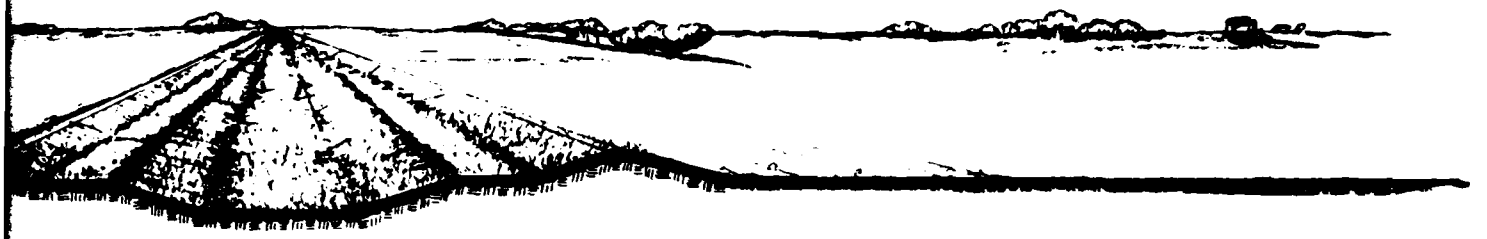


ALTERNATIVE 3.

ALTERNATIVE 4.

CONCEPTUAL VIEWS

ALTERNATIVE 1
ALTERNATIVE 2
ALTERNATIVE 3
ALTERNATIVE 4



ALTERNATIVE 1.

ALTERNATIVE 2.

ALTERNATIVE 3.

ALTERNATIVE 4.

LEGEND TO ALTERNATIVES

ALTERNATIVE 1. ——— prairie grasses

ALTERNATIVE 2. — prairie grasses, ¶ shrubs

ALTERNATIVE 3. — prairie grasses, shrubs, ¶ trees

ALTERNATIVE 4. — prairie grasses, shrubs, ¶ shelterbelts

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
ST PAUL MINNESOTA

DESIGN MEMORANDUM NO.1 GENERAL - PHASE I PLAN FORMULATION
FLOOD CONTROL
WILD RICE RIVER - SOUTH BRANCH
WILD RICE RIVER AND FELTON DITCH, MINNESOTA
RECOMMENDED IMPROVEMENTS
POTENTIAL VEGETATIVE TREATMENTS

SUBMITTED BY
APPROVED
DATE

DRAWING NUMBER
SHEET OF

PLATE 2


FILME
9